# Popular Science

More than 200 **Pictures** 

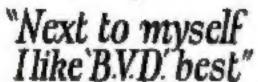


Skimming the Atlantic at 75 miles an hour ~ Page 42

\$1,000 IN CASH PRIZES EVERY MONTH JULY

See Page 12

25 CENTS





#### Does Your Underwear Meet This Test?

The test of underwear comfort is to be able to forget you have underwear on.

The one way to be sure that your underwear will meet that test, is to look for the red-woven "B.V.D." label.

Nothing without that label is "B.V.D."—nor can it offer that matchless Comfort, Fit and Wear which have given "B.V.D." a generation of world-leading popularity.

#### What's Back of that "B.V.D." Label?

A quality as unique as the fame of the trademark! From its specially treated rainsook, woven in our own mile, to its last lock-minched seam, "B.V. D." is an underwest with differences that count. To undetented the docent of death viral to undetweet value, write for our interesting free booklet, "Why the Knowing Millions Says "Next to Myself I Like B.V. D." Best!" It tells just how "B.V. D." is made and is a revelution in the fine points of fine underweat.

#### We Want You Properly Fitted!

The beight of union suit comfort comes only in "B.V.D." with its patented construction at shoulder, waisthand and crotch. But be covered meanered. From over stary sites, for widely varying "builds," years can always be determined by I simple entircling measurements: I Chart — I. Wais — 3. Tunk (under crotch and over shoulder). If your dealer is in doubt earn your site, write the B.V.D. Service Bureau, 350 Broadway, New York City, giving above measurements.

Be Sure to SEE it's "B.V.D."

It ALWAYS Bears this Red-Woven Lubel



Chattanida Co Feet Feet Regis Contract

The B. V. D. Company, Inc., New York

Sole Makers

"B. V. D." Underwear

"B. V. D."
Union Suit
Parad Factor
Men's \$1.50
the suit
Youths' 85c

"B. V. D." Shirts and Drawers 85c the garment



## A Box of Curls

#### AN EDITORIAL

HE WAS so young that he scarcely had accurate control of his tiny legs. Long, yellow curls nestled to his neck and hung about his shoulders. And he gurgled gleefully as the barber, with his scissors, snipped off curl after curl.

Over in the corner the mother watched, a timid, half-frightened expression on her face. From time to time she dabbed at her eyes with a handkerchief. A manicurist watched a moment, and then spoke quietly to the mother. In a moment she was smiling.

When the barber had made a boy of the baby, the shop's cashier produced a long box marked "Baby's Hair," and into it went every curl the barber had cut. Then it was given to the mother. This was ten years ago, and that mother still has those curls—and still talks of the agrees she got in that shop. Year by year the shop has prospered.

IN MY home town is a drug store. From the outside it looks just like any other little drug store. But it has a business twice as large as any other store in the village. Once I asked the proprietor why.

"Well," he said, "I have the things people need, and I get them to my customers when they want them. Service is my basic policy."

That thought which the barber and the drug store man found so vital to their progress can be used to advantage by any individual or any business. It is a thought that is the underlying policy of Populan Science Monthly, that goes into the making of every and that has carried us forward for

office we depend upon the prodence in our everyday lives. Utility, practical application, the satisfying of existing human need—these are the aims of modern science. And month after month this magazine renders service by translating the technical news of each achievement into terms that are understandable to any man.

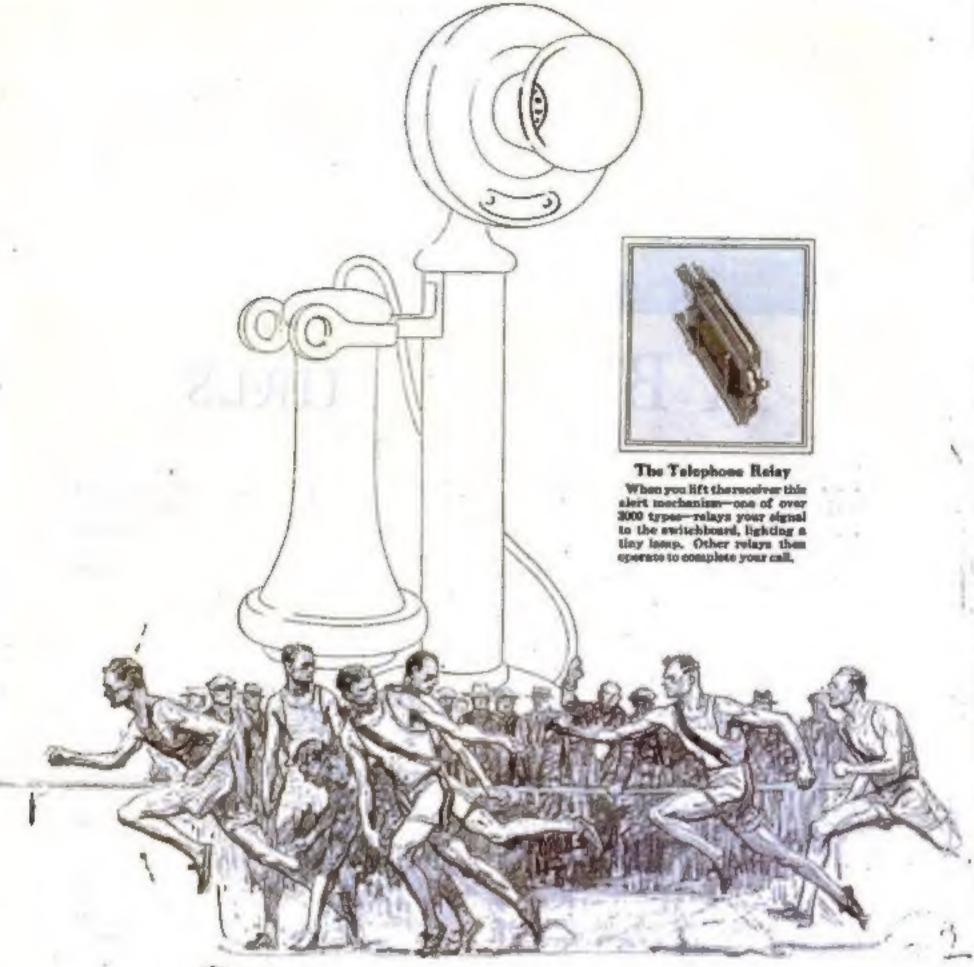
IN EVERY issue are articles, written by authorities, explaining just how you can save time and money by utilizing scientific products. Turn over the pages of the magazine. You will find useful articles—on radio, automobiles, oil burners, home building, woodworking and metal working. Every one of them is part of our planned campaign of service.

Behind each of them are elaborate departments manned by experts, to advise you on specific technical problems. It is the province of these departments to help you apply the developments of science and mechanics to your particular needs. It is their task to give you information you can make use of; to answer questions that are puzzling you.

AND the services of Popular Science Monthly do not end there. The widely known Popular Science Institute of Standards was established by this magazine to offer to our readers a reliable guide in their selections of technical products. The Institute's advice is yours for the asking, and its tests enable the magazine to protect you by guaranteeing the merchandise advertised in its columns.

The barber and the druggist and POPULAR SCIENCE MONTHLY are successful because they deliver service. And, like the mailman, we must keep delivering to succeed.—S.N.B.

\*\*Cates, its presentant, and Canada, \$2.50, fereign countries. 51 The contents this character must not be reprinted without permission. In presenting in original columns numerous stories of new products of applied science, beare Moachity does not underwrite the business methods of the concerns producing them. The use of Peppular Science Moathity welling schemes to never authorized. C. R. Capet, President W. Baso, Vice-President, A. L. Cole, Scuretary.



## Relay runners in your telephone circuit

The relay runner, carrying on from man to man, finds his counterpart in the telephone relay. Every time you lift your receiver off the hook you set in motion a relay system which, if less thrilling than a race, is infinitely faster and surer to come through.

The telephone relay is the heart of a vast unseen plant which you are apt to take for granted. Like every other

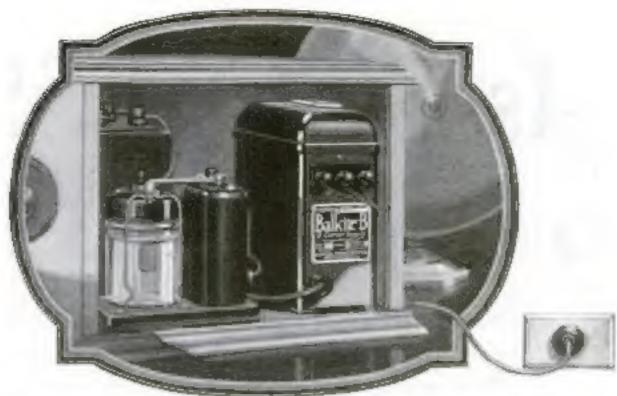
part it must be skillfully built—and the whole carefully fitted together.

Western Electric has one hundred per cent responsibility for manufacturing the equipment for the Bell System It is our business to make every' from relay to switchboard, ' phones to cable, and ' to the uniform " not fail."



Vestern

E 1882 MANT



## Salkite Balkite Trickle Charger convert your radio receiver into a light socket set



Balkita Trickle Charger

Converts any 6-volt "A" harresy of 10 empere hours of more into an automatic "A" power unit that furnishes "A" current from the light cocket. With 4-volt and smaller 6-volt batteries may be used as an intermitters charger. Or as a trickle charger if a resistance is added to our down the charging rain, \$10, West of Rockies, \$10.50, In Canada, \$15.



Balkite Battery Charger

The popular rapid charger for a well-"A" besteries. Noiseless. Can be used while the set is in operation. Special model for 25-40 cycles. \$19.50. West of Rockies, \$20. In Canada, \$27.50.



Balkite "B"

Eliminates "B" batteries and supplies place current from the light tocket. Keeps the "B" circuit always at full power. For sets of 5 tubes and less, \$35, In Canada, \$49.50.

Balkite "B" II

Will serve any standard set. Capacmy 20 milliampetes at 135 volts. Especially adapted to sets of 6 tubes or more, \$25, In Canada, \$75. Operate your present receiver from the light socket. Then you need never again worry about recharging or replacing batteries. Nor will your set ever again be handicapped by weak power. With full, even power, always exactly as required, your set will give consistently good reception to be had in no other way.

No changes in your set are necessary. You need add only Balkite "B" and the Balkite Trickle Charger, Balkite "B" replaces"B" batteries entirely and supplies "B" current from the light socket. The Balkite Trickle Charger, once connected to the lighting circuit, is left on permanent charge. It keeps your "A" battery always at full power. For maximum convenience.

you may also purchase from your dealer a switch that cuts out the charger and turns on Balkite "B" during operation.

Both Balkite "B" and the Balkite Trickle Charger\* are entirely noiseless. They are permanent pieces of equipment with no bulbs or moving parts and nothing to replace or get out of order. Other than a negligible amount of household current, their first cost is the last. Add them to your set and convert it into a light socket receiver. Ask your dealer.

The Balkite System of Trickle (or centingers) The Balkite System of Trickle (or continuous) Charging to standard in many industrice besides radio. In realway signal systems, where absolute intallibility of operation is required, in use in practically universal, and the Balkite Railway Signal Rectifier is standard on over 50 leading American and Canadian Rubroads. The same method is also used for charging telephone, burgler alarm, emergency lighting and other harmer systems. In fact whetever there are batteries to be that god Balkita Rectifiers on trackle charge are now in use Logicalist are invited as write for industriation.

## Radio Power Units

Manufactured by FANSTEEL PRODUCTS COMPANY, Inc., North Chicago, Illinois

Sole Licensees in the United Konplette Meson, Ratio Accessores Ltd., 4-13 Hyrhe Rd., Willesden, London, N. W. 10



## Is SUCCESS Too Good to Be True?

Are you hesitating about enrolling for a course of training, or huying a tech-nical library, or investigating any of the other "Money Making Oppor-tunities" in Popular Science Monthly because they sound too good to be true?

AVE you glanced over the ads and decided that they didn't fit your case? Have you allowed opportunities to slip through your grasp because you couldn't see how anything so fine could ever come your way?

Then get that idea out of your head right now! You CAN succeed. You CAN become a trained man. You CAN win your way to better pay and a big-

ger future—if you want to.

Every one of the advertisers in the "Money Making Opportunities" Section of this magazine (see pages 104 to 127) can tell you of dozens of cases where men with no more opportunity, no more education, no more advantages than you, climbed to the

Just one thing is necessary—confidence in yourself! If other fellows have won success—fellows no smarter than you-then you can do it, too!

CUCCESS may sound too good to be true. You may not be able to imagine yourself earning \$70, or \$80, or \$100 a week. It may seem like a "pipe dream" to picture yourself riding around in a fine big car of your own, owning your home, carrying around a bank book with a nice tidy sum marked down in it for a rainy day.

It will pay you to read "Money Making Opportunities" Pages 104 to 127]

sands who, though they thought it was "too good to be true," decided to find out first.

POPULAR SCIENCE MONTHLY has made it easy for you to learn how others succeeded, by grouping in one convenient section the greatest array of "Money Making Opportunities" ever offered. Turn to it now, on pages 104 to 127. Start with the first ad and go through them all, one by one, till you come to the one that represents the kind of success you'd like to have! No matter if it seems "too good to be true," inves-But just remember—thousands of tigate what the advertiser has to of- you can win the things that now seem other men enjoy these things. Thou- fer. Let him tell you his story-let him "too good to be true."

submit proof that big pay is within your reach. That's all he asks, just a chance to prove that he can help you,

OU need have no hesitancy about L answering any advertisement of training, books, sales agency, or other opportunity, in the POPULAR SCIENCE MONTHLY. Every one is carefully investigated and only advertisers of reputable standing are permitted in this magazine. We do this to protect

It will pay you well to turn to the "Money Making Opportunities" Section now. For there lies your furureyour road to promotion and greater earning power-the quick, easy way to win the worth-while things of life. In a few minutes you can survey the opportunities in dozens of attractive professions and trades, pick our those which appeal to you mose, and write to the advertisers for full particulars.

DOPULAR SCIENCE MONTHLY believes I that every man has the power of success within himself. No matter what others may tell you, no matter what obstacles you have to overcome, if you want to succeed, then you can succeed. Turn now to pages 104 to 127, this month's "Money Making Opportunities" Section, and see how easily

Money Making Opportunities for Readers of Popular Science Monthly

Read the Advertisements Under the Above Heading! Sec pages 104 to 127 NOW!





GAYLORD HOSE REEL Fits direct to the sill poek.

GAYLORD SPONGE WASHER Cannot scratch in washing cars

YOU WILL find this equipment far superior to any you have ever tried. You can now cut your water bill in half, wash your car in half the time, spray the lawn and garden, or water potted plants with-out getting your feet wet with messy puddles as The Control Is in Your Hand.

#### GAYLORD WATER SAVING DEVICES

You keep the hose on the reel full of water, always in readiness for any job and a most efficient fire protection. You use only the water you actually need in this efficient way. If you ever have used the Gaylord water saving devices you will never be without them. Tear off the coupon, checking the com-bination best suited to your needs, and send with your check or money order.

Send for our free book, "Beating the Water Meter"

WATER

GAYLORD WATER SAVER Simple to operate - no springs or loose parts to get out of order. Water shuts itself off when plunger is released.

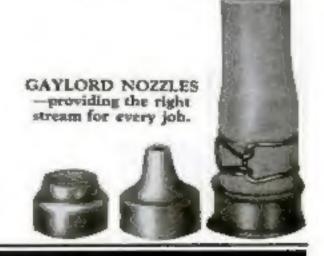
If your dealer cannot furnish you with Gaylord water saving devices, tear off this coupon and check the nozzle or combination that is best suited to your needs, enclosing money order or check. Fill in your name and address on the margin of this page.

Water Saver \$2.00 3 pozzles 50c each 1.50 7.50 Hose reel 9.00 Combination offer

GAYLORD MANUFACTURING CO.,

Paterson, N. J.

2.00



Sponge Auto Washer



## SEAL that really Means Something



### Why You Can Depend on Products Approved by the Institute

"FESTED and approved" does not mean a thing, unless the tests be thorough and impartial and the standards high. Everyone knows that the value of test findings depends entirely on the quality of the tests and the integrity of the organization making the test. It does not take an expert

to recognize this.

It does take an expert, however, to judge the quality of tests. Noted engineers have spent hours inspecting the laboratory of the Popular Science Institute of Standards and witnessing tests. Their opinions will interest those who are guided by the Institute's findings when buying radio and roof equipment but who are neither in a position to visit the laboratory nor to judge what they might see there.

There are three comments that are almost invariably stressed by those who have visited the laboratory. One is the completeness of the tests; the second, the quantity of expensive testing equipment; and the third, the ability and knowledge of the Institute's testing staff. Statements like these have weight when made by men who are technically equipped to judge—men who rank high in radio, engineering and electrical circles, and who have been

prominent in establishing standards and devising test methods,

As to the impartiality of the Institute's tests, its executive staff alone is proof of this. Dean Collins P. Bliss of New York University is its Director, and no product is approved by the Popular Science Institute without his sanction. Dean Bliss is head of the department of mechanical engineering and director of testing laboratories at

#### Popular Science Monthly GUARANTEE

The above seal on an advertisement indicates that the products referred to have been approved after test by the Popular Science Institute of Standards...

POPULAR SCHENCE MOSTRET GUATANtees every article of merchanduc advertised en its columns. Readers who buy products advertised to Popular SCHERCE MONTHLY may expect them to give absolute satisfaction under normal and proper use. Our readers in buying these produces are guaranteed this satisfaction by Popular SCHENGE MONTHLY.

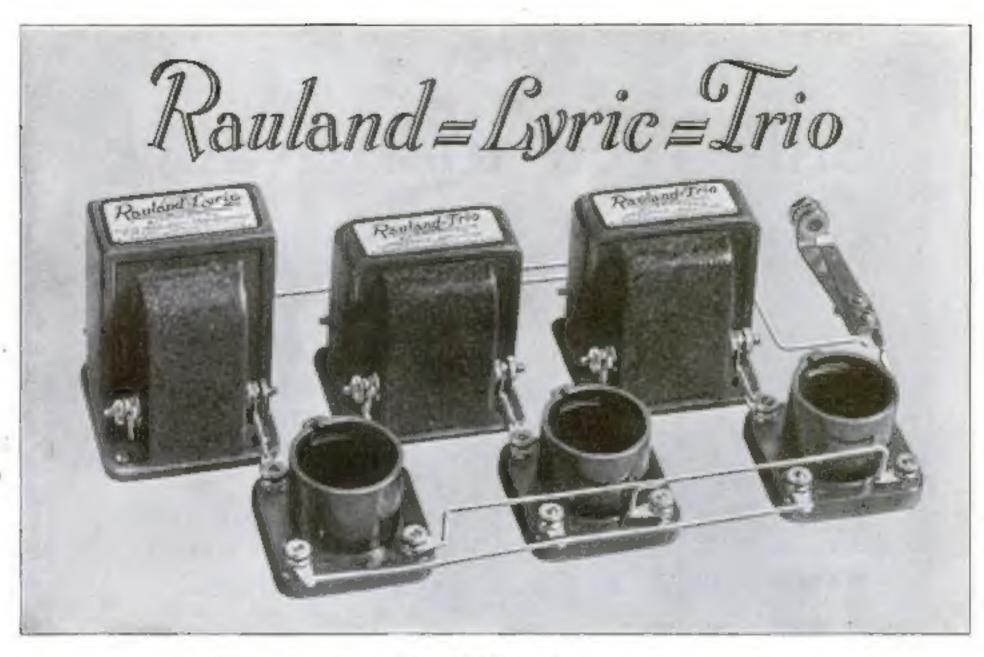
Тик Рупсивень

New York University, and has now been made associate dean of their College of Engineering. The Institute's Associate Director is Dr. H. G. Tyler, associate professor of mechanical engineering at the same university.

That the Institute's standards are high is best testified by the large total of products disapproved, as well as by the following incident. A well-known and reliable manufacturer pur on the market last season a product that failed to come up to the standards of the Popular Science Institute of Standards. It was, however, approved by more than a dozen other laboratories. The manufacturer's experience with the product was such that, after it had been on the market several months, he stopped production.

THERE is a sequel to this little story. Just recently this same manufacturer sent in another product for test—a new one that he is planning to put on the market immediately. The general manager of the concern came on to New York and made a personal visit to our laboratory to learn how tests were coming. From him we learned that production is not to be started on this new product unless it is angualifiedly approved by Popular Science Institute of Standards.

A list of the radio and tool products that have received the approval of the Institute is available on request. Address: Popular Science Institute, 250 Fourth Avenue, New York City.



## A remarkable improvement in audio amplification

New unit perfected by All-American Engineers gives you the full, pure, natural tone you have always sought

YOU have always wanted the ideal result in audio amplification—pure, natural tone with good volume. The laboratories of All-American Radio Corporation have developed a new method of audio amplification and now bring to you this long sought ideal result in the—

#### Rauland = Lyric = Trio

You know the Rauland-Lyric transformer. Its exceptional tone perfection has made it the largest selling quality transformer in the world. The Rauland-Lyric is now used in combination with the new Rauland-Trio (impedance units) to produce the Rauland-Lyric-Trio

amplifier—the highest known perfection in three stage audio amplification.

It is well known that any system of amplification using instruments of similar characteristics has inherent disadvantages. Ranland-Lyric-Trio successfully combines the two leading systems—transformer and im-

pedance coupling—coordinated to retain the advantages of both and to eliminate their weaknesses.

This new method consists of a Rauland-Lyric transformer for the first stage, a Rauland-Trio Type R-300 impedance for the second stage, and a Rauland-Trio Type R-310 impedance for the third stage.

#### Rauland=Trio

This is a triple feature instrument containing an inductance, a capacity and a resistance in one compact impedance unit. Through laboratory tests of utmost precision, absolutely correct balance is maintained between these important factors. You secure full advantage of

impedance amplification and overcome the common variance of commercial types of condensers and resistances. Rauland-Lyric-Trio is the last word in audio amplification.

A free book, "Modern Andio Amplification," tells more about this interesting new development. Write for handbook B-90.

Chlidian impro

#### ALL-AMERICAN RADIO CORPORATION 4205 BELMONT AVE., CHICAGO, U. S. A.

Station WENR-266 Meters- is owned and operated by the All-American Radio Corporation

### Still Well in Advance

#### Grebe Developments Keep the Synchrophase in the Lead in Quality of Reception

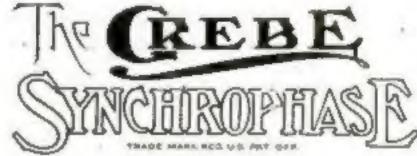
THE quality of Grebe reception is still the standard. Exclusive Grebe developments -Flexible Unit Control, "Colortone", LowWave Extension Circuits, Binocular Coils, S-L-F Condensers, etc.-keep it far in the lead.

The way to satisfy yourself of this is to

Ask your dealer to demonstrate the Synchrophase in comparison with other sets.

A. H. Grebe & Co., Inc., 109 West 57th Street, New York Factory: Richmond Hill, New York Western Branch: 443 So. San Pedro St., Los Angeles, Cal.

> This Company owns and operates stations WAHQ and WBOQ; also low-wave rebroadcasting stations, Mobile WGMU and Marine WRMU





All Orebe apparatus is covered by patents granted and pending.

Copying/and missarius





Exclusive

Grebe Developments

Grebe Binocular Coils

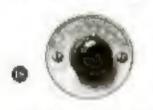
and

Law. Wave

Extension Circuits

Grebe Diel

Flexible Unit Control



Grebe "Colortone"



lt is written.

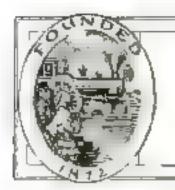
"A gem is not polished without rubbing, nor a man perfected without

The perfection of the Synchrophase has come from post years of conscious study and experiment



The Synchrophase is also supplied with battery base





#### POPULAR SCIENCE MONTHLY

SUMNER N. BLOSSOM, Editor July, 1926



## Millions of Americans Are Committing

## SLOW SUICIDE

Stealthy poisons are to be found in at least 92 percent of illegal liquor—What they do to the human body—An impartial investigation into the medical and chemical aspects of prohibition

#### By Donald Wilhelm

A NEW chemical warfare is rayaging the bostes of millions of known case, threatening the general beath of the nation. To combat it seems a task more difficult than protecting so army against military poison gases.

It cha leages doctors and public health officials more than infant mortality more than ordinary epidemies, more than keep-

ing one milk, our druking water and our food supplies feed of pollution. I refer to the tremendous problem presented by the fact that in I ions of apparently in tell gent. Anterseans are daily possening themselves by drussing the dead's chemical conceptions which have been developed as autostitutes for the conventional alcohola beverages take i away by Probibition.

It is as if they had resolved on a gigantic dance of death in the full of the moont as if by crasy incontutation to socialistly, they had hypnotized themselves into behaving that evends of potassium. For instance, is a wholesome draw

Cyanide of potassium, any chemical textbook will tell you, is a deadly possion one of the most violent. A few drops will kill a manwill kill a borse.

And yet, only the other day or an enlightened Massachusetts city where a great electrical industry uses many bar rets of industrial alcohol. I was offered a drink by a gay young man a chemist. It s perfectly good gan the assacsi me "He make th"

"But tel n in how we make it has

equally booyant roommate broke in.

"This is how. Some of the alcohol used.

in the plant contains a small quantity of eyande of polynoum. Somebody theoverest that, if you shake this alcohol with skim nulk, the cyanule combines with the milk and settles to the hottom. Then we appear off the top.

I shook my bead, and declined the

western state that I vooted last winter

And the next day, in the same enlightened state, in another city where is a plant making unitation issues toolet actudes. I was offered another drink

My first explained. "Our bootlegger gets his absolud from the plant. It is perfectly good alcohol except that it is denoteded with a little menthol. Some

> local people maye drank too noich of it and got d gestive trouble. But a little won t lart you?

> I DUG into my pocket for a beaffet every long-lifer needs to carry in his bill food these days. The Covertment Printing Office in Washington charges five cons for it. It is called "Appendix to Regulations No. 61, Formulae for Completely and Specially Denatured Alcohol." In it are set down forty-seven for mulae with which manufac-

most compay in order to make the method they sed undrukable. Formula No. I specifies that industrial alcohol to be used for any of more than a hundred manufacturing purposes, including the manufacture of unitation avery unist be

turers of industrial alcohol

densitured by the addition to every 100 gailous "of fire gallous appoint good alcohol." Quite different from

a little menthol .

Somebody but hed. But her about hooch constitute the new communicable disease

Posonous substances such as wood alcohol, however, tell no lies when we

#### The Real Problem of Prohibition

A THE arguments about prohibition, almost everything has been discussed except the one fact which converts the public more immediately perhaps than any other number that rank prosons are steating outside dismacher of militaria of Americans under the autom of triuskey, and true and here

Americans under the guare of whisher gin wine and here. How dangerous are these concessions? Just what are the risks in developing the hours from reliar stills like the one pictured here? In America confronted with a new and incidence and in the hours and artist?

In the article, an experienced investigator and senter gives
the best available universe to these ques
twee. In presenting the startling facts
on Mr. Is ilbelia has found them
Popular Science Monthely holds
no beseffeither for a against
prohibition that propose
is simply to tell what every
one wants to know that is
what the 1996 brand of
hourse has in it
— The Editor

drick. Their method sounded about as conducive to safety as crossing your forgers when your earling out of an arrivalent about as reasonable as melting the solidified abcohol used for heat and pouring it through a silk handkerchief to parify it ensystem of obtaining "potable" alcohol that was popular in a certain



Even Homemade Wine Holds Dangers

Wine is being made today in countless homes; yet few Americans, say asperts, understand the precautions necessary in safeguerd it from hermful impurcions such precoutions as aging and preventing contact with metal. Here to Hugu Ringstress, a chemist for the Internal Revenue Bureau, testing and training various wines

Wood alcohol keeps its deink them! promises, those exactly what it is expected. to do when taken into our bodies how quickly is merely a nutter of combines. and how tough in the hody. "In pereral," says Dr. Frank P. Underhill. professor of pharmacology and toxicology at Yale, "the fatal dose varies between one mid two minces.

Our public hospitals, private sanitaripms and doctors every day are treating pien and women prastrated or blinded by word alcohol, or suffering from the cumolative effect of small quantities used over a period of time. For wood alcohol isn't burned promptly by the body to earbon dioxide and water, as grain alcohol is:

[71TH methyl (wood) alcohol porsoming 'says Dr Underhill," the stage of excitement characteristic of ethyl (grain) alcohol is usually absent Instead the most outstanding feature is depression and weakness. There is bendache, nausea, vomiting, violent abdominal paras, muscular incoordination, weak, rapid pulse, dysproca, cyanous, restlessness, non-sensitive, d-lated pupils, low temperature, cold, monst skin, sometimes despute, generally come, infrequently convulsions, and death from respiratory fa luce. Total blummess may be sudden.

Since nowadays the typical man knows more about his body—and less about his drink than the typical physician knew fifty years ago, it is worth adding that methyl and ethyl alcohol are only part. of the alcohol family.

There is also amyl alcohol—seven kinds -any of them five times more possessons than ethyl or grain alcohol. But the most popular nowadays is commonly known as fusel oil.

Fusel oil is formed in fermentation. Unless you know more about chemistry than chemists, and more about quantity production of liquor than distillers, the only way you can rid new liquor of fusel

cut is to age it, as long charred barrels. And our mestern beesth made in distillenes, the direction of chemly by ignorant, irrespons ble people from envilage fermented for cattle (rom solidified fuel atrobol, from derivatives of sourconnived or a city factory. It is made in swamps and mountain fastnesses where stagment water is used. in the mash, where the mash is exposed to bactera, where pure, rats and other animals, drawned have been found in the masti. Lye lust been used to instenferroentation, pomungauge of potash, a dendas poisona l'agos

the product. Creasate is used to give it a 'bend ' It is made in dougs cellure, tenements, attres, garages, homes, in harrisdry and both total in stills devised from auto parts, and other old metal. And the results are known from hospitals and satulazionis, fram doctors, from apatranec-

company reports, and from other authorstative sources'

Government officials estimade that 600,000,000 pallous of melustrial alcohol denataced with the mary prosonous substances indicated in the booklet I mentioned glasse are renatured annually by boot leggers—three and one half billions of dollars' worth of booch at five dollars a quart!

As much hoseh again probably is being made "from the ground up. " that is, by detallation. About forty multion dolare worth, the Department of Commerce estimates, is being struggled across our 17,500 miles of border line. All of this latter, except an occamonal bottle, is made synthetiearly in Canada or on Rum How ships, or if genuine, is diluted 'cut before it is put on the market

"HE result is that government chemists in twentytwo division laboratories in asmany parts of the country, engaged continuously with nothing except the analysis of second liquor, have found that, among 100 specimens of hooch, from ninety-two to 100 not only are not up to the old-time standard of whiskey, but are actually mark poison!

In other words, wherever you drank in the Laited States

as twenty years, m isn't aged. It isn't under government supervision. It ma't, except in rare in-Staures, made under ists. It is made most-

A Poison Peddler

A belt like this concealed beneath the cost is one of the bootlegger's favorite ways of carrying his goods. The chances of getting ' real stuff " from him are about \$ in 100

these days, your clamers of obtaining "real stuff" are never better than eight m a hundred'

Resently I talked with a bio-chemist in a great university who has given years to studying the effect of puisons on our bodies. "It is too bad." he told me, "that people generally know so little about chemistry Everyone ought to learn that you can't make good liquor in a day. It s a dreadful tragedy at knockabort farce, this idea that you can ron denntured alcohol through a still just once and get pure alcohol.

S A matter of fact Non conduction A by the riost precise fractional distillation, ordain percenticoloi the first time. There is overlapping. Dot laction begins before the body ig point is reached, and the holding point of the many denabigants sames torain alcohol, for instance, bodo at seventy-eight degrees centigrade and I doubt if most bootleggers know what 'ee tigrade menas. But the may ladeobels, including firseloil, an only based that makes male proportions with medial, ether and beizene, come over between one loundred and one handeed thirty-seven degrees. And, on the other hand, to go no further, the scul alders des come over at around twenty degrees, early in the game along with some of the other ald avides, which breads that these poisons are not remexed, or even resuced accessors a by distribution, They are merely removed from our conto per to sustain

by distillenes, where they had the firest equipment, the greatest care was taken to get ind of auch passonous mic-

> stances as the aldehydes and fusel on. Hence the hour want tures. The first and last parts of the distillate were thrown away. Our nan ifacti ring bootleggers, who use all-kinds of ericle equipmert, can t possibly know and apply the inceries. Resides lacy reafter country

"BUT even the igh whole range of distillation, most of the hooch on the market is a devil s brew like nothing ever seen in a laboratory. ICs. promut' It might be less numer is if it were aged But when you consider that it was always a doputed question among medical men and physiologists as to whether the best product of the old distillenes, acient 6 cally made and property aged actually was 'fit to drack," what can you say about the presentday booch 2 "

I asked an attending physician at a great hospital in Boston, "What can you say about the present day hoorbwhat - it doing to our

botnes? 1

"In the old days," he answered, "alcoholie personing was alcoholic personing. Whiskey was whiskey, wine was wine, heer was beer, alcunol was alcohol. So we had an atcoholic ward, logically. We find now in the medical wards symptoms that are, yet azen't, alcoholic. We're having to revise our knowledge of syraptoms. Diagnosis has become a fine art

I WENT to a practicing physician in Philadephia with the same question, "What is the present-day booch doing to one bothes?

"Without question," he said, "many porsonous aubatances heretofore used to end life are now being drank cheerfully by unlhows of Americans, It's past me! In every second home to which I go, people are making things to druck which they call whoskey, wille or beer.

"Wine making is an ascient art we Americans don't understand. I am tood that the cases used abould be aulphused. Lain

told that no nictal should be brought into contact with the wine. I doubt if these precoutions are observed. Many people here are making beer which I understand in like making cheese. If it sports right, you get beer; if stamoub wrong, you get something else. I mag-

me that it usually spoils wrong, because of the way it a made. Brewerses used to be almost surgicially clean. They had to be, or the beer spoiled wrong. It was a matter of good business. Special cultured yeasts no longer obtainable by the public were used. Wild yeasts are injurious. I can only guess how many families are consuming bacteria we doctors wouldn't recognize under a inscroscope!

An industrial chemist in New York City, who makes tests for bootleggers, said, "I am not often caded in to test beer, though it is estimated that thirty mol)con small barrels a year, about half as much as was made in pre-loistend days, are now being made. But in what I have tested. I have found acid-forming and other bacteria such as is present in sported food. In some instances I have found a pathogenic or disease-breeding condition

I had learned from railroad figures that shipments of grapes from Califorms had increased 500 percent in five years, that the total from Canfornia not to count shipments from other states and consumption locally in many parts of the country, aggregated 74,834 cars or 1925. So I asked the chemist about wine.

"M NY people are making wine." he said "Much of it is made in foreign settlements where whole families crush the grapes—generally with their feet! Unually it is aged for a few months, and kept for family use, because there isn't the market demand for it that exists for hough. House is the main interest of a lot of chemists. By the way, I asked one bootlegger why he bothered to here a chemist, 'It s good business,' he told me-'A dead customer never buys the stuff' "

He anded: "Most of them don't care a lung, can't or won't understand what "The Devil's Brow"

comprises much of modern. booch a made mostly by agnorant overpossible penple moset over under fifthy conditions. Virtually all of a contacts deadly pour ries. Below a total officer is displaying a typical fifty gallon moonshine still



the stuff they're marketing does to a drinker's body. Why, one of the most prosperous toutleggers I know handed in the abriliable ward of Bellevice Hospital net heig age!

SO I WENT in my quest to find out chemistry does to the human body, to Bellevue. There the husast ambulances in the world assemble all manner of emergency cases from five of the boroughs of New York City. The alcoholic wards for both women and men are smaller, I found, than they used to be, partly because many of the patients hought in now are unconscious, and may have fractuesd skalls, or he suffering from any of a large new number of weird kinds of porsoning, and are sent immediately for treatment in the medical wards rather than in the alcoholic ward.

There are lever cases of debrum tremens in Belfer ne now than there used to he; fewer suffering from prolonged convalsions and wrist drop. There are fewer "repeaters"—old-timens returning again and again. There are fewer real old soaks of the kind that were associated with the three-cent whiskey that was like modern broch, though not so destructive. I am told. The new stuff has chimiated the old soaks. They couldn't stand it! Only a few weeks back a porter at Bellevue went to a "speak-easy" for an afternoon drink. At seven he was brought in. An hour or so later he was dead

There is a great increase, however, in the proportion of cases suffering from comma and from hallsemosis obsession with the idea that armies, or relatives, or fiends of various sorts, are trying to kill them. In contrast with the cases in the old days, they die promptly or they clear up promptly. And why? "Because," one Nine Out of Ten Not Safe

De William V Linder chief chemist of the Internal Revenue Bureau testing operiment of "hooch" in his Laboratory Covernment officials estimate that 600,000,000 pullans of industrial sleahal densitized with many passessous substances are re-natured anmuchly by bootleggers. As much again probably to made from the ground up by reases of distillation

of the Bellevue physicians told me, "it took a long period of druking in the old days to had a man here. He had to be saturated. It took weeks or months perhaps to get him satirated. And it took as long to get him cleared up, With present-day hough, though, he can't get saturated. He collapses may be dies—long before he reaches that

"I account for the hallneincon and our greater turnover by the presence in much of the modern hooch of ether and other volatile substances added to drinks to give them a 'keek '"

bither mixes readily with alcohol, and when so mixed the body telerates it to some extent but when it is taken raw an onnee is sufficient to enose death.

Effer taken in drinks has exused death at Bellevue. So has benzene, a coal-tur product not to be confused with benzinc. a petroleum product with which you clear your clothes. So have fusel oil, wood alcohol formaldelis de di-ethyl pythulste, and prestine, all of which are used as detacturants

BUT they are only a few of the dena-turants used. Moreover federal goverument requirements stipulate that in many instances two or more shall be used in combination. Thus, to every 100 gallons of alcohol to be used to photographic work, the manufacturer most and "sixty five pounds adpharic ether, three pounds cadona todole, and three pounds amno noun sodide. Among still others used are acetaldehyde and soup, culoroform and shellar, acetic and tanne acid, acc tone, camplior and a tro-benzene, which is used in the preparation of explosives and in the making of max, shoe dyes and smeades. Add also and ne, a constar product used in dves, planial or carbolacid pyrrol and morac the emetic. Add sulphuric acid, various essenting ous, citijone, ammonia, ascotine, rolline, no thlese blue, methyl saheylate, and hruence, hist cousin of stryclause.

Various of this second string of decinturants, singly oc (Continued on page 114)

## What's Wrong?-- \$1,000 in PRIZES



MARY'S boby nephew has come to visit the Newlyweds, and they are having their troubles. The baby has fallen downstains trace. John and blary decide on "safety first measures, on they begin build-

ing a gate above the top step on the first floor landing. What things are they doing wrong and why are they wrong? What mistakes has the artist made in drawing the picture? Bend suswers not letter than July 20.

#### Find the Mistakes in This Picture

If IT is true, as Sam Loyd observes, that "the successful ones are those who have a natural faculty for solving puzzles," then the number of successful people is increasing surprisingly every day. For each day's mail brings hundreds of additions to the thousands of Populas Science Monthly readers who are finding fascinating entertainment and profit in our great series of monthly \$1,000 Picture Contests.

Many have written telling us that in searching the Contest pictures for the

mistakes of John and Mary Newlywed and for the hidden errors of the artist, their monds have been made more alert, their powers of observation sharpened, and they have learned to do many useful small jobs around their own homes.

"I count John and Mary among the best friends I have." writes a contractor from Des Momes, lows. "Every mouth when I meet this energetic young comple between the covers of Porulus Science Mowrilly, I learn something new from them. They are the kind of friends a man takes to make and keep, for they are always stimulating. They keep you guessing and they make you think—to they go about their jobs of homemaking, they are forever challenging you to earth them in a mistake. And no matter how much you may enticise them, they never hold st against you.

Have you made friends yet with John and Mary? If not, you have been missing a lot of worth-while enjoyment, to say nothing of the opportunity of winning one of the substantial cash prizes awarded

each month to the winners in the

How observant are you? How alert? Are you quick to detect errors in your owl work or in other people's? Here's a chance to test yourself in a way you will had an interesting as any game. you ever played.

The idea of the Contest is simple enough. Each month we print a picture of John and Mary Newlywed at work on some odd job about their home. Always they go at the Joh with much esthusiosin, but with little experence and mechanical knowledge to not these. And so they pinke plenty of austakes, some of them int te obvious.

In the parture either John or Many or both of them, are doing or have done one or more things in the uning way. In addition, the nrist purposely has made a num-

ber of errors in deasing the picture. You are to see how many of these motakes your can find, make a list of them, and send them, with your reasons, to the Picture Contest Editor, Portland Schools MONTHLY, 850 Fourth avenue, New York

One thousand dollars in antiv-three TP-4 | 19-40 | (+ | 1-44 | -27 | -27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27 | 1-27

#### Test Your Alertness and Win a Prize

Port LAR Science Monthly is award- . Ing \$1,000 in sixty-three cash prizes for the best answers submuted in the fascinating contest described on this page. The cash prizes will be distributed. as follows:

First Prize \$	500
Second Prize	100
Third Prize	- 50
10 Prizes, \$10 each	100
50 Prizes, \$5 each	250
Total Prizes \$1	,000

each prizes will be awarded to the contestants who point out the largest number. of mustakes of any land, and who present their explanations of these errors in the clearest and nest skilful way

In this mouth's picture, as you can see, John and Mary have a guest in their home. Mary's baby nephew has come to visit them, and they are having their troubles. The bally has fallen downstairs twice so fac. And while no serious barot has been done, the Newlyweds have decided to play safe and buist a gate at the top step on the first floor landing. The picture shows them at work

First read the rules of the Contest. Then examine the picture carefully. What is being done wrong by John and Mary, and why is it wrong? Want has the artist वेत्त्रकम करणाहरू

As you discover the mistakes, list them neatly on paper with penand ink or typewriter including with each answer a beief explanation, and send your list in. Ask the members of your family and your friends to help you. They will enjoy playing the game with you. You can sidenit as many

arparate entries as voir desire.

You have until July 30 to submit your And when you have completed your entry, you will be enger to try your hand at another "What's Wrong perture which will appear in next month's

<del>tita anno trant e a comitê tita antita e ancesa ancesa a contracta</del> fra a sra a ri

#### The Rules of the Contest-Follow Them Carefully

Bach month, until further notice, 1. POPULAR SCIENCE MONTHLY IN printing a picture of John and Mary Newlywed doing some simple job about the home. Each picture shows John or Mary, or both, doing one or more things in the wrong way and, in addition, there are a number of deliberate matakes by the artist in drawing the picture. You are to tell us what things are being

done wrong and what things are drawn wrong in each picture, and why they are wrong.

2. MONTHLY will award POPULAR SCIENCE \$1,000 each month in 63 cmit. prises for the best answers giving the greatest number of mistakes in the picture. These cash prises will be distributed so follows:

First Prize \$500 100 Second Prise Third Prize Nest 10 Prizes, \$10 100 esch Next 50 Prises, \$5 each 250 Total Cash Prizes \$1,000 each month

Prizes will be award-

3. ed to those persons who point out the largest number of actual mistakes found in the picture and who present their explanations of the errors in the clearest and most skilful way. Actual mestaken shall be construed in all cases to mean mistakes appearing in the picture about

which there can be no question in the

opinion of the judges. In case of ties,

the full amount of the prize will be given. to each tying contestant

Answers to each picture must be 4. mailed or delivered to the offices of POPULAN SCIENCE MONTHLY not. later than the thirtieth of the month following the date of publication of the magazine in which the picture appears. Thus, to unsure consideration in this month's contest, appearers to the picture in this month's issue, published June 10, must be mailed or declianges or corrections will be allowed in any entry after submission, but any contestant may submit as many separate entries as he desires.

All entries should be addressed to O. the Picture Contest Editor Port LAR SCIENCE MONTHLY, 250 Fourth avenue. New York City. Name and address of the entrant must be written

plainly on each page of the entry. Entrice with maufitcient postage will not be accepted. The publishers cannot be responsible for delay, loss, or non-delivery of entries. No contribution entered in this contest will be acknowledged and none will be returned. No lettern of inquiry regarding points covered in the rules can be

7. prove your knowledge You pay nothing Just and observation. You need not buy POPULAR SCIENCE. MONTHLY to compete, You can borrow a copy from a friend or you can examine one at any office of Postslan SCIENCE MONTHLY or at public libraries free of charge. Each contest is open to everybody, except

employees of POPULAR SCIENCE MONTHLY and the Popular Science Institute of Standards and their familien.

8. Officials of the Popular Science Institute of Standards will act as sudges and their decisions will be final. Acceptance of these rules is an implied condition of each entry.

#### First Winners Next Month

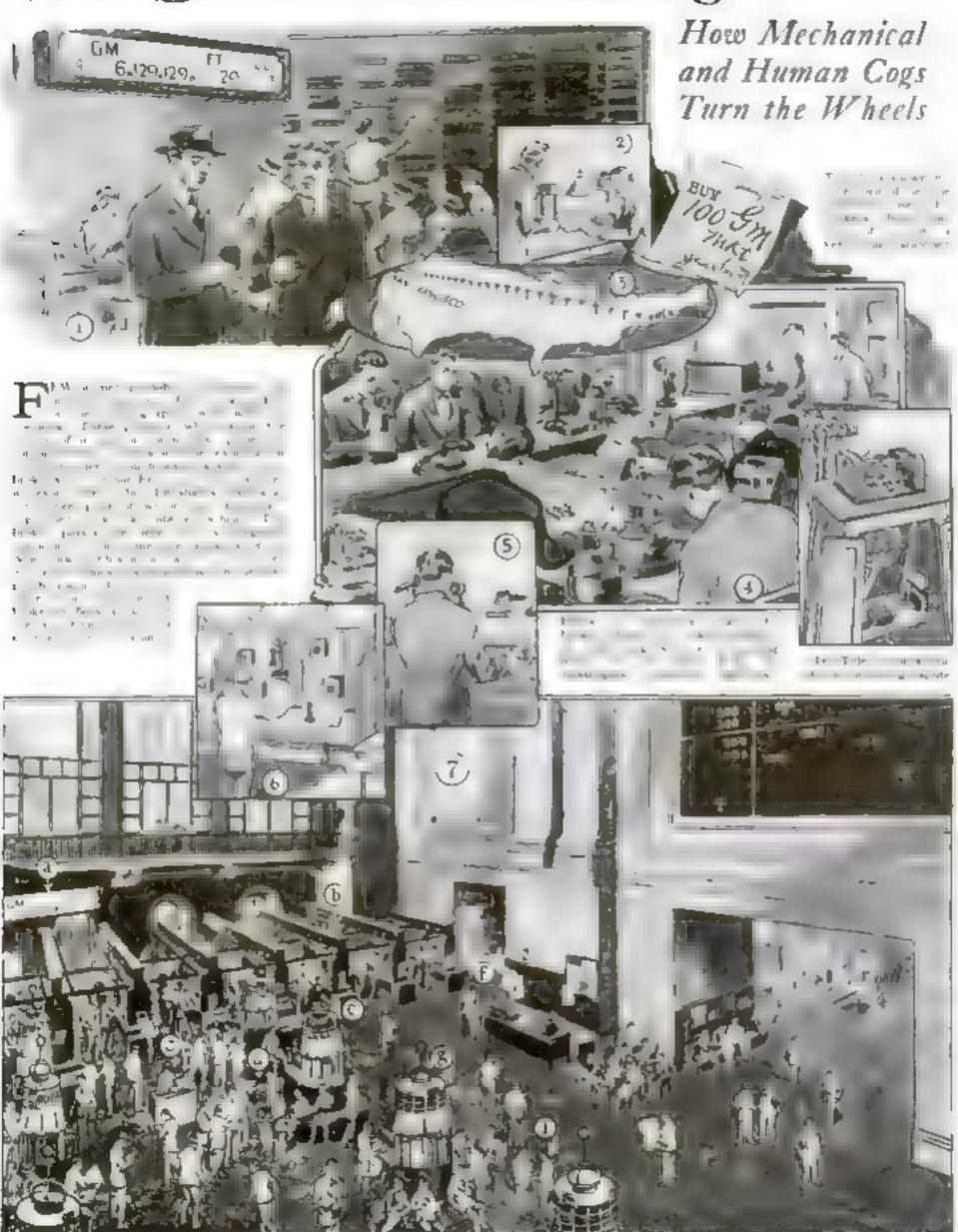
TN NEXT month's issue will be announced the names of prize winners in the first of our monthly \$1,000 Picture Contests, which appeared in the March number. The judges will award axty-three cash prices, totaling \$1,000, to contestants who submitted the best unsivers for the first picture of the series. Winners in succeeding contests will be announced in later issues.

Also, watch for a new contest next month.

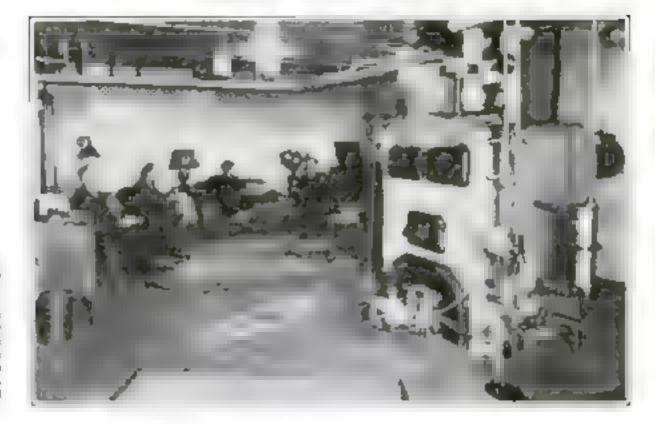
byered not later than July 30. No entry bearing a postmarked date later than the closing date for entry will be considered.

Answers may be submitted on any 5. kind of paper, but they must be typewritten or written in ink, and on one ade of the paper only. Each error must be listed separately and numbered. No

## WallStreet-An Amazing Machine



The telegraph operator turns over the order correctately to an order clerk 5; who establishes telephone contact with the broker's booth 6 on the floor of the New York Stock Exchange 7; merely by pressing a batton. When the clerk in the booth is precious the order or signals the bruker who is on the floor of the exchange, by means of the electric annunciator board shown in upper right hand corner of picture. The broker purchases the stock required at one of the posts to an the exchange floor. Listed stocks are divided among twenty nine such posts, about forty stocks to a post. Confirmation is transmitted by a reverse process back to San Francisco, the whole transaction of the Generallying no more than a manufer.



CARS ICE in the un Derbying pulicy of Popular Science MONTHLY Thursdale, the first of an unusually toformalize series, purries out this pulsey. Alr. Fander associate editor of The Heuring and Lentitating Mayorine and recedury of public relations of the American Society of Healing and Lent lating Engineers is one of the country's leading experts on house heating with oil find His next acticle will appear in an early limite

This comfortable having room in the home of Wanfield T Scott, of Passair, M J., now or upice the space the formerly was used for the cost and wood, before the autaliation of fired boster was in the foreground.

### What an Oil Burner Offers You

An expert answers the questions on cost, safety, and comfort that everybody wants to know before selecting and installing the new type of domestic heating equipment

By P. E. FANSLER

OMESTIC oil burners are more discussed throughout the United States today than any other contributor to home comfort. Appearmately 190,000 homes in which coal was used last winter will be heated with oil this year. Thousands of people are wondering just what an oil burner is, what it will do and what it will not do.

Intensity up this interest are recent coal shortages and the normal wholesome American demand for modern comfort

and convenience in the home. To supply the demand, there have been developed oil burners that will give" heating comfort" in any type of heating apparatus, in a house of any size, anywhere in the linded States.

The chief advantage of an oil burner is, of course, its conventence. The labor connected with its operation is infinitesimal as compared with that with a coalfired plant, which requires at-When you burn twelve tons of coal a year, you shove shout 150 pounds of coal a day in the coldest parts of the winter. With an ad burner, an almost superhuman thermostat feeds heat to your home as required. And the thermostat will obtain a more uniform temperature from an oil-hurning plant than it can from a coal fired system.

Many of the people who already have oil-burning equipment in their homes give as their chief reason for the change the increased cleanliness. The fuel is stored in a tight steel tank, usually outside the house, and is piped to the burner and consumed with practically no results. The dirty, disagreeable job of ash removal is entirely dispensed with. A Chicago woman who has had an oil burner in her home for five years told me recently that it was installed so that her humband might have his winter but relay.



#### Advice on Oil Burners

THE services of the Popular Science Institute of Standards are available to all readers of Populan Science Monthly.

To determine the efficiency of the several burners under actual working conditions, the Institute has undertaken, in conjunction with The Heating and Ventilating Magazine, a nation-wide survey of homes in which oil burners have been installed

This survey is, perhaps, the most elaborate of its kind ever made. Burners in homes in every section of the United States are being inspected by engineers and reports are being compiled on the satisfaction given individuals by the different makes

For information about oil-burning equipment for your home, address: Popular Science Institute of Standards, 250 Fourth Avenue, New York City.

aftermoons to houself. Previously he had spent them sufface ashes

The characters of the dost and detaces sardy results to amproved health for the family. And so, too, does the marvelous autformaty of temperature that a possible only with find finds. It is true of course, that an increasing number of coul-fixed plants are thermostatically controlled but in possible ing uniformity of temperature they compare with oil plants about as the old "one-lung" horseless

carrage compares with the eight cylinder car of today

Usually thermostats shaple yet wonderful little instruments are set to hold within the limits of two degrees. This means for example, that, if you set your thermostat at 68°, the burner will be started when the room cools to 67° and shot off when it heats up to 69°. Such an formuly of temperature according to physicales, will do much to eliminate colds and other winter adments.

VERY recently there has been developed for oil-burner regulation what is known as a two-period thermostal. This device holds the temperature at any desired part during the day, lowers it a specified number of degrees at night, and increases the heat early in the morning to means confort at rising time.

Many people who have of burners tell me that the first cost of their equipment has been returned in added usable space. Hundreds of coal bins have been turned into bullard rooms. And in other bomes the accumulation of dirt and junk that cluttered the cellar has given way to children's playrooms. In one place, a coal bin was turned into a dining room.

I have been asked repeatedly if an oil burner is safe for a small home. Properly installed, the fire risk with a modern oil plant is so small that for practical purposes it can be disregarded altogether. A burner "listed" by the Underwriters Laboratories, and installed according to the regulations of the National Board of Fire Underwriters, involves less risk than the average coal-fired plant.

AND as greater care is used in the installation of burners, the fire risk is rapidly declining toward the vanishing point. To this end the Underwriters reconmend that only employees of burner manifacturers or men trained by them be permitted to install of-burning equipment. With such men you can be sure that your flues and channeys are property cleaned and your pipe lines tested.

The Underwriters' Laboratories have tested a large manber of luminers and have "listed" about forty of them. But this "listing" is no way testifies to the efficiency of the burner. It means meres that in the rough laboratory tests the burner has met a standard of safets, that a study of its operation design, constructs a god materials shows that it is as reasonably safe as human ingenisty and eareful factory fabrication and inspection can make it

As a further protection for the readers of Pop Lar Science Monthly, burners listed by the Laderwriters' Laborator esare tested in the laboratories of the Popular Science Institute of Standards In determine Dierr roor booting efficiency and in addition a nation well survey of existing instadutions is being made to determine the efficiency of operation is actual usage. Approval of a borner by toe listitute means that it does elfimently and antafactorily the work of is designed to do. that it is sold at a fair price, and that the mountacturer much tains service and installation facilities that incore satisfaction.

PERHAPS the question I have heard most frequently is, "What is the best oil burner." I afortunately, there is no best burner. There are many good ones and some poor ones, But, like radio sets, some give a larger degree of satisfaction under certain circumstances than under others. Much depends on the one of the bouse to be heated, its type of heating can prient and other factors. Much depends upon your particular ideas of what constitutes "satisfaction." What is a good od burner for your next door neighbor is not always a good one for you.

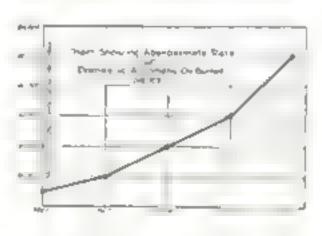
Each home offers a specific problem—a problem that the Popular Science Institute of Standards can help you to solve. But in writing for advice it is well to remember that no oil-horner expert can offer worth-while advice without complete details as to your heating system, the size of the home, the type of construction, and the size and disposition of radiators.

Early in the development of the automatic oil burner, the noise of operation was a distinct disadvantage. However, today, after a period of refinement, many mechanical draft burners may be called almost noiseless. "Atmospheric draft humors," those depending upon the natural draft of the chimney, get away from the hum of motors and blowers, as they do not have these elements.

Some of these, as well as some of the mechanical draft burners, have proved



During cold weather, a man showely desty his two twents in coal into the furnace



In less then five years, the number of oil burners in our throughout the country has increased from 5.000 to more than 200,000

very inefficient, and others have been brought to a high degree of perfection. I recently tested an atmospheric burner and found it so quiet that with my eac against the boiler shell. I could not tell from the sound whether or not the burner was in operation. Over two periods of more than a month each, the boiler doors were not even opened.

People have asked me about the odors from oil burners. Given tight oil burner connecting the storage tauk and the burner, there should be no smell. The cause of smells is the same as the cause of fires—leakage of oil, usually outside of the furnace. In suproperly out threads on the pipe lines or other cardless installation lie the greatest dangers from oil burners.

Oil burners now are adaptable to practically every kind of heating plant, warm air, steam, water, or vapor. They will operate efficiently in a kitchen range, a small fornace or boiler, or the huge boilers under the largest apartment houses and office buildings. Thousands of California hungalows of five and six rooms are heated with oil, as are the Woolworth building and the Singer building in New York City. No matter what the size of your home, there is an oil burner that

A few years ago, oil for domestic licating could be obtained on vior a few distincts outside of the oil-producing areas.

Today, hardly a city of consequence is not served with oil suitable for domestic

not served with oil suitable for domestic burners. In many cities of \$0,000 and \$0,000 population, several kinds of oil fuel may be had, at prices ranging from six cents a gadon to eleven cents. This latter price should include the delivery to any home within reasonable distance.

The ratiol cost of or burners varies just as the prices of automobiles and radio sels vary formal targets of the atmosphere or seculed gravity type, controlled by hand can be installed for less than one handred dollars. Such burners are, at best, but makeshelts, as d yet today there are many of them in actual use and extensive investigations infrate that even with their deadymitages the average owner world not revert to the use of coal. Better humers of the same type range in price up to about \$5.0 and should prove thoroughly satisfactory to the owner of a small large who is not too exacting.

YOU can select mechanical draft of burners to sait your needs and tastes at prices ranging from an and 8050 to about \$1,000. The higher priced ones of muse are more carefully built, of the liquest class numberals and the price includes larger fact tasks and more reliacionate and conveniences than the lower-priced ones. Examples of such burners have records of several years of use without a single service rail.

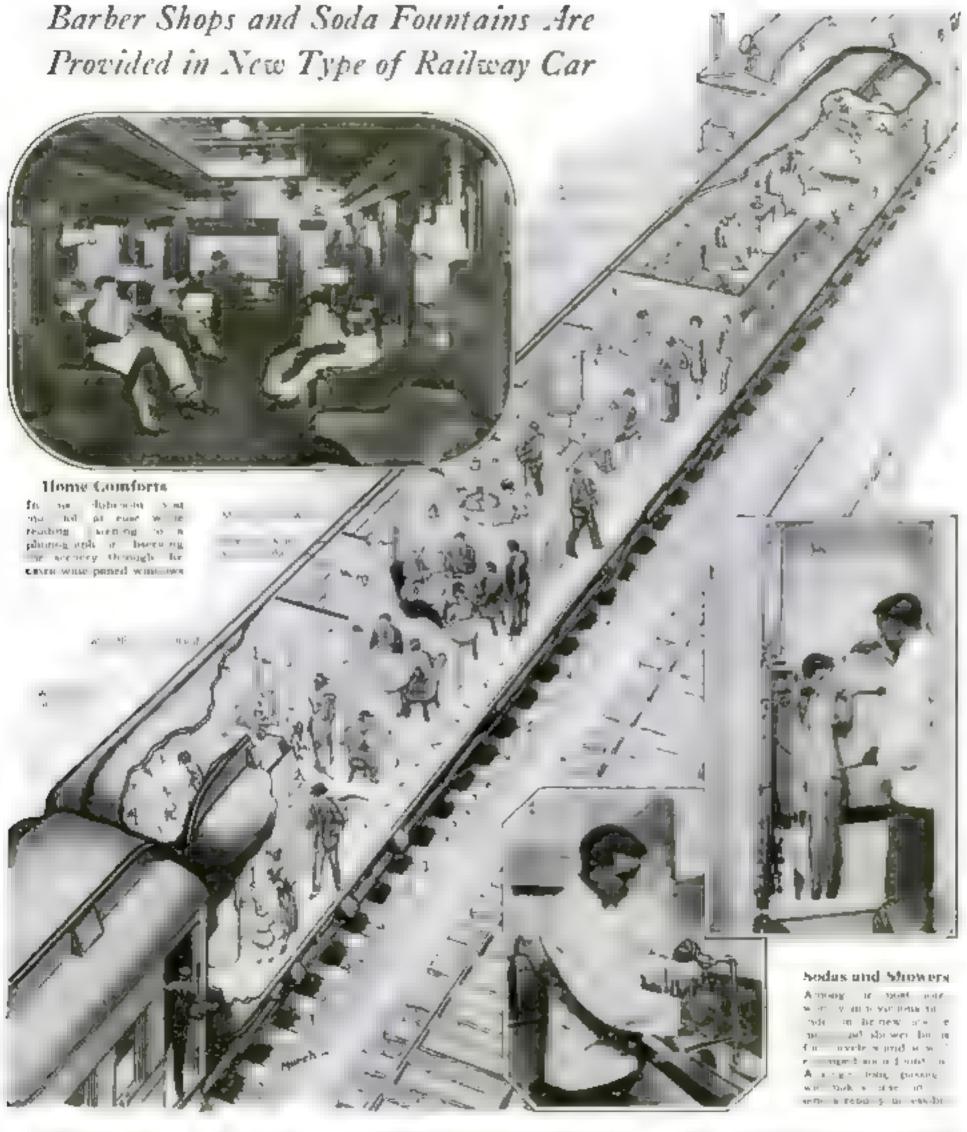
When a man asks me to compare the operation costs of an oil burner with those of a cost-fired plant. I tell lum that it can't be done. Coal is land-fired with intich labor and dort. If you pay a "furnace man," you should include his wage as part of your heating by I

Even with a bired man to fend the firnace and a thermostal to control a coal bre, you cannot get the same. I call a comfort—that you can with a gone of borner. Consequently you cannot conpare costs. In different locals results cost of a ton of coal may be greater or less than the cost of a quantity of sel contaning the same amount of heat, but this ratio of costs is not a comparison of resolts obtained

FI EL costs with coal depend much on the intelligence with which the firing is done. You may use fifteen tons of coal a year. Your neighbor with an identical house may use twe ve tons, or eighteen tons. But with thermostatically reges lated oil burners, the fuel hills in the two horses should differ very 100e.

Even is cases where the oil burner is made easily to operate than the coult plant, you are getting ample return in increased comfort and convenience. Various men who have burned oil in their homes for periods of from two to six years have told me they would not go back to coul even if oil cost from twenty to 100 percent more than coal. In a county in thuous noted for its coal production, where coal can be bought for about the cost of mining it, a larger number of people have installed oil burners in proportion to the population than in sections bundreds of miles from coal impos.

### A Luxurious Hotel on Wheels



vides all the accurres of the modern hotel for the traveler by rul. Without a total length of eighty three feet, these remarkable cars, ten of which have been built for the Northern Paintie, provide longe rooms, card rooms, shower baths for both men and women, a fully equipped soft druck parlor a barber shop, valet service and observation platform.

Starting innovations in railway car design were necessary to provide space for so many luxuries. Ordinary car doors and steps have been eliminated. The only entrance to the car is by way of the Pullimon to which it is coupled. The space ordinarily used for vestibilies is put to other service. The shower baths are supplied by an air-pressure water system with tanks of 350 gallons capacity.

Great pains have been taken to get rid of any surfacity in appearance to orderary chair cars. The seats in the lounge rooms and all of the decorations are no evidual to design. Each lounge contains a prior agraph library and other comforts.

and for a final touch of licery, a powerful electric searchlight has been fitted over the observation platform, making sight-seeing possible at hight.

## The MAGIC EYE

Photo-electric cell is working miracles in the long-distance transmission of pictures, and promises other wonderful achievements



Courses a Jani Telephone Lathurgaries

A New Marvel

This little glass rube the photoplectric cell is one of the marvels of the twentieth century. It makes possible long distance transmission of photores. At the right Rewards engineers of the Bell Tamphone Laboratories in New York City A. R. Olpas and A. L. Johnstod. They are seen experimenting with one of the latest types of photo-electric cells.

A MAN walked note the offices of the Maccourt Wireless Telegraph Company in Longo the other day, and there unde out his personal clock for #1 000, drawn on a New York trust company Twenty minutes later that clock, having traveled by

radio across the Atlantic, was honored by a New York back and deposited. Hazdly had the ink dised on the usan a signature before his onsines, associates some 2500 innes away were looking at an exact dupocate of what he had not written!

A few days afterward photographs of Forogram events and personages in horse mee at Newmarket in England Premier Baldwin on his way to a strike conference. One Prince of Wales at Harritz and news pictures of the British general strike—were flashed over the sea and published in American newspapers a few latter after they were taken

These nester is of the recent opening of the world's first commercial trans. Manbe pretire service were laded not only as remarkable new nonexements to swift erman enestrop hot as marking one more majortant step toward the fascinating goal of teles sion or sight at a distance.

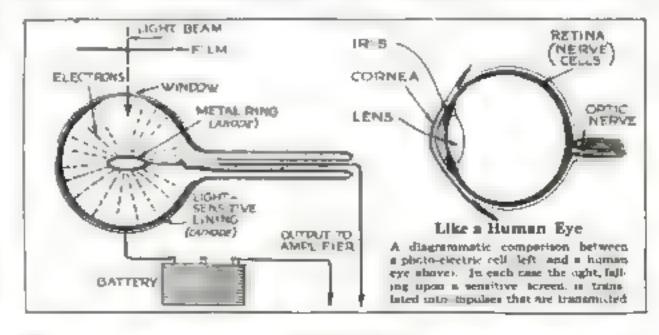
I, ttle by little we are approaching this crow and marvel of communication. Each your our eyes are seeing farther and far ther. Through the magic glasses of electricity by were and radio, far-off faces, series and pictures are being brought almost instaitaneously within our range of vision. Before many years, we are told, it may be possible for us to sit in the theater or in our homes and "look in " on rbstant events as they are enacted just as we now "listen in" with our radios to distant voices and music. Perhaps, even, when we answer the telephone, we may see the person at the other end of the line while we talk with him. Indeed, from Educated Belon, the noted French inventhe, we have the prediction that "when the next fresident of the United States in mangurated there years hence, an audience in a moving picture show in Paris will watch the ceremony exactly as though they were present and at the presise moment it is going on."

That such things are credible, that they are accepted today as possibilities of the next feture, is due to the perfection of a little glass instrument no larger Unic your hand, yet one of the most wonderful de-

receive concered. It is the photo-electric cell, an electrical 'eve' so keen that it is almost as sensitive to light as the marvelous mechanism of the himan eve, of which it is a copy.

THE seal secret which malifes this little instrument to perform its marvels, however, his in its ability to translate variations of light into corresyonding variations of electric current. This is the property which has name it possible not only to send pretures and writing over long distances by ratho and wire, but to perform intricate and as-

terms of electricity. Only the other day, for example, a photo-electric cell was employed by Professor Joel Stebbrus, threator of the Wanbburn Observatory of the University of Wiscomes, to measure and weigh state so far distant that their light takes hundreds of years to reach its? In like manner, as told in the April more of Portland Science Monthly, the same little glass tube enabled Bengt Streengren, the extremy carried actentific winard





Another form of the photo-electric cell with gloss bulb broken away to show the interior construction. The connecting wares may be compared with the optic nerve in the human eye

## that SEES across the OCEAN

By H. C. DAVIS

of Denmark, automatically to register the movements of the stars,

Its possibilities are allororgan of electrical vision may reveal to us mulathcured mysteries of far-distant sons and planets.

Perhaps a comparison with the himan eve will give the best idea of how amazingly the photo-electric cell has been made to

record what it "sees" through to be of space. As you look at this pape ( r example, the lens of each of your even, like the leas of a camera, is throwing ioamage of everything within its range of the sensitive screen called the return 1 -hy ng screen is made up of cotaherve cel s, forming a mosaic of a repoints. Each of these points is highly sensitive to the electroning networks waves which we call light; so that any one of them, when light in focused upon it, is numeriately storred to activity. Each cell, too, in connected with the brain by a nerve fiber—a little line of communication which instantly transmits the impression and records it on the brain,

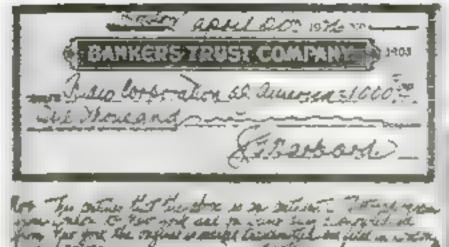
THIS, when the image of this page is thrown on the retma, it is divided up



Courtsey Van Fork Haraki Tribuna

#### A Horse Race by Long Distance

Photo of horse race at Newmarket track England, finished by radio across the wes and printed on this orde of the ocean just a few hours after the photograph was taken



into thousands of tray patches of light, shadow and color resort of separately yet all torus on to form a complete and parts of the retire the many Security of the retire that it has been estimated there are at least title and are the square responding to its light and preording its unage. When you look at a near a face of a dark twenty feet at takes about ten thousand of them to record the face on your brain.

Now the photo-electric cell is like any one of these tiny cells of the human eve. Highly sensitive to light, when struck by waves of light it is accused instantly to

> activity. Take the human cell, there are attached to it little wires of communication which, through the medium of an electric current, carry a record of the impression it receives. In short, the photo-electric cell simply translates the light impulses it receives into electrical impulses. The latter travel along wares or through the ether and are recorded on an electrical "brain." or receiving apparatus, in such a way that they can be translated back into visible images of light and shadow

THERE is one important dif-I ference, however, between this wonderful electrical eve and the human eye. Where the latter has millions of cells to make an instantaneous record of all the pin-point patches of light comprosing a complete image, the former has only a single cell to do the work. In picture transprission that single cell, however, has been made to accomplish the purpose in a most ingenious Since it cannot see and record a picture as a whole, it does the next best thing. It scans the parture a patch at a time, recording each portion separately, until the entire preture is completed. It is as if you were to read this page, letter by letter, until the entire page with

Across in Twenty Minutes

The check was sent from Lemma New York in Art in the a Helius Cope is R. H. R. G. of he But. It per our a Arm is a reason of a reason of the art is a cope of the art is a reason of the art is a cope of the art is a cope



its words, sentences and paragraphs were recorded in your moid.

Examine for a moment a typical photo-electric cell. Here is a small glass tube with a bulb at one end, nomewhat rescorbling the tuber in your ratho set. On the mode surface of the bolb is a thin conting of potassium or similar material sensitive to light, and from the coat ug a sensed-in were note to the outside of the hulo. In the center of the bulb, and separated from the sensitive element, is a roug of nonsensitive metal—platinum or nickel—and from this a second wire runs out through the stem of the tobe. The two wires are connected through a battery which constantly applies electrical pressure to them, and through an amplifier which in lurg is connected with relays that operate special telegraphic sending apparatus. At one point on the bulb is a little window through which light can be admitted.

If OW see how it works to translate the lights and shadows of a picture into electrical impulses that can be transmitted. Around the surface of a glass cy inder is placed a film bearing the image or picture to be sent. On the film a sharp pencil point of light is east. As the cylinder alowly revolves, the narrow beam of I got passes swiftly across the film in a succession of thin, parallel lines. Every time it strikes a dark patch, the beam of light is cut off, while the light portions allow it to shine through.

By an arrangement of lenses and reflectors, the light which passes through the film is focused on the little window of the photo-electric cell. What the electrical eye "sees," then, as the beam passes across the film, is a rapid succession of lights and "Continued on page 113)



#### By WILLIAM J. WHITE, JR.

In the following article up able reporter persents the results of a careful investigation of the secrets by schick graphologists claim they can read a man a character in his handwriting This art, while generally discredited by scien-Eists, alongys has been a source of much interest and entertainment ) on will enjoy teving out the methods which Mr. White explains here

YN ONE of the great structures that hear down upon the end of Manhat-Lan Island, seemingly intent upon foreing it beneath the surface of the surroundary waters, in the sinte of offices of a limnower who is at once the envy and admiration of all with whom he comes in combutt.

His hus ness is not large, in fact he seems to discourage any great growth, preferring to keep it well hader his personal supervision. But it is extremely The continual source of profitable, amazement to his associates is but so much his success—there are hundreds of men down-town with equally large incomes, and many with larger. Rather it is his meaning ability in passing judgment apon the integrity of atrangers with whom he does hasaness.

IN A great city like New York, and par-ticularly in that section known throughout the world as Wall street, there are at work sharpees who neek to profit from the ignorance and credibity of others. This man's business is of a nature that he comes in contact with many of that breed. Movies to the contrary, these accenters are not easily recognizable Were pulgment made on agreezemen nione, many an honest man would have hern ordered incerementously to leave while the trickster was being presented with the combination to the safe.

And yet this business man seems always to pick them right. His friends know that in many of his deals there isn't time to look up the family history of a casual business acquaintance. How then, they ass, rines he avoid being bitten occasionally? And, receiving no answer, they ascribe his success either to luck or

His secret is known to only two men lumself and Robert R. Ross. The latter s mame is not on the pay risk, it is doubtful if any of the clerks outside of the firaneter's private secretary has ever heard of

Does Your Pen Reveal You Can Tell What a Man Really Is

> Say Graphologists — How They Read hun. His yearly retamer is paid from the financier's private checking ac-

bursks.

Ross is a "graphologist a special of in determining a person's character

count and is not

entered on the firm's

from his handwriting. At intervals his chent visits him and submits a bank eleck or a sheet of paper bearing a specimen of handwriting. Ross analyzes it gives his openion of the character of the writer. The client leaves, and in a day or two los friends have something new to a miler about. He has "guessed ' right

Such as one man a faith in graphology

I could mention many offer cases quite similar. It is pretty generally know a that many husiness firms make use of the services of professional graphologists in selecting their employees. What, then, is there in this so-called seigner to warrant such

implicat confidence?

I discovered that there is little of the occult about graphology. Its proponents assect it to be an expet science, based upon estamore sense and observation. Its possebolit es for analyru g character are sehered to have been doesvered by no Italian named Busto in the early part of the seventeenth century. From that time to the present it has undergone many changes, old steas have been east and s and new ones smolituted, until today its

supporters, though doagreering with

Tarles & Anglies

Resembling a hastily written figure 8, the small # so the signature of the former Secretary of State reveals to the graphologist acuteness of mind and been perception. The decreasing one

of the small letters toward the end of such word denotes tack, while the angularity of the strokes shows strong affections. Shiewdress and re-serve are indicated by the wedge-shaped writing



pre ens T - #P - 6 This a a a pge di coma colo E 0 / to to of his percentage TO GO E eres de la la estada. for the way of their all A KIND HID AN b the Hamana was were diposi. Quite obviously they were a made for effect, but be opoka ekstroctezistic en thusans and energy

believe at july the " of - ter orige - to ca langue cours . I it you and In desire to see just

Farthfully zour Therdor Rosacly-

### Your Character?

#### from the Way He Crosses His t's, Secrets in Handwriting Quirks

regard to a few minor details, are in general agreement regarding the meaning of various types of handwriting and are amere in their convictions that the deduc-

tions they make are accurate.

Shortly before Richard E. Enright retired as police commissioner of New York City a monaght conference was held at headquarters, attended by the commissioner, one of his deputies, Joseph A Fancot, and Dr. Abert J. Snoth, wellknown grapho-psychologist of Brooklyn, to whom I am indebted for many of the analyses on these pages. The purpose was the attempted solution, by means of graphology, of a baffing double iminder.

BRIFFLY, the coronistances were as follows: A socially prominent man and a woman were found slain, revealing the fact that both had been leading double lives, some each was married. Suspicion pointed toward the man's wife, but the

police had not a single clew worthy of the name to work on. At the time Dr. Smith was called in, the search for the municiper was about to be discontinued as hopoless.

Four letters, identical in text, were given to Dr. Smith for analysis. One was written by the woman under suspicion, the others were copied by persons known to the commissioner.

"Which of these writers is capable of committing such a crime?" The commissioner asked Dr. Smith, who, after a careful examination

of the four specimens, fluilly selected one. "Here's the person you want," be

announced.

The communioner and his deputy gasped. Dr. Smith had picked the letter written by the murdered man's wife! On the basis of that deduction, the police renewed their efforts to pin the crime on the woman although as yet they have failed to secure sufficient evidence to warrant her indictment.



Areenecaken Defect.

Mr. Depew's small letters are sharp, indicating lacidity and cound resenting. His gental nature is used to be betrayed by the m, n, w, and capital M, all of which are formed in much the same way. This formation, say the graphologists, is always a sign of an affable and friendly disposition. The long stroke of the p slee indicates aggressiveness.

The graphologist starts out with the basic idea that there is a reason back of every move made by the pea. Most of their theories are easy to follow. Say, for example, that the writing is small and neat in appearance. One would expect the writer to be neat in his habits as well. The small size of the letters, graphologists say, implies concentration and attention to detail. And, reversing the process, graphologists reason that one who writes

Furt Tuerley Evenus.

Every one of his pupils well

Want to his him

Very suicerely year

Churcalana

There is a rhythmic swing to the noted singer's pen which, the graphologust declares, evidences an inherent love of music. The writing last a decided upward tient, denoting high ideals and ambition. It is shaded but not manny, judycating that the writer is fend of the beautiful and artistic in all things. The activationse warranted by Miss Case's achievements it found in the graceful flourish of the highesture shows so the reproduction of one of her letters



With any very bed with.

The handwriting of this fumous thestrical producer is called an excellent example of the combination incultive and deductive remover is characteristic indicated by the paration of letters in several of the words, and the hook-

ing up of the small of with the capital \$\textit{\textit{B}}\$ in the augmented. The sharphess of the strukes is said to indicate acutehess of perception, while the sample, dignified capitals show high artistic tests. The general impremion of speed tolls of inclosveress. Comphologists, generally, one of the opusion that this writing is full of character.

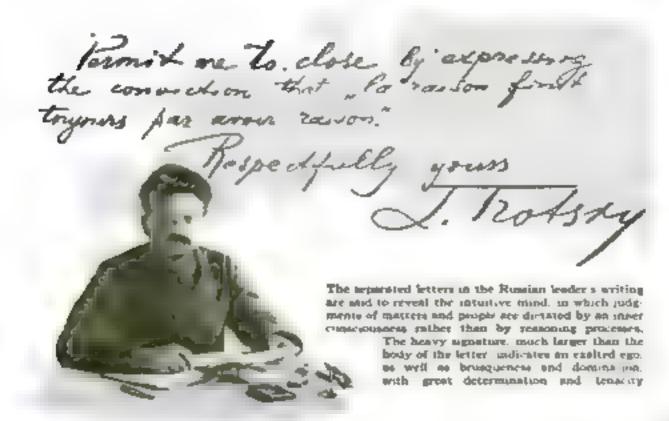
with large characters is inclined to generalize, and dishkes detail.

In analyzing a piece of handwriting, the graphologist considers these points first: The size of the writing; the slope; the shape of the individual letters, including a comparoon of the height of capitals and small letters; the thickness of the strokes; the space between the individual letters and the space between words; margins; connections, finals, that is, the word endings, flourishes, and the amount of deviation, either up or down, in a line of writing from the normal horizontal.

QO SERIOUSLY does the graphologist. O regard princtuation that he puts it in a class by itself. That meluites the crossing of the f's, the dotting of the f's and f's, the commus, periods, colons, etc. By far the most important of these is the terming. Many exponents profess to be able to give a fairly accurate reading of a surject's character from an examination of the f's alone, but on the whole they advoce that the entire specimen be carefully examined before any judgment is passed. It would be as unfair, they any, to condeinn a writer because of one had attribute croppring up occasionally as to form a fixed equinon of a stranger's irritability simply after overhearing a word or two spoken

It was almost on the strength of the punctuation alone that Dr. Smith made an analysis involving the loan of several themselves of dollars by a bank on an inisecured note. The integrity shown in other parts of the hand was attested to by careful punctuation. The bank took a

chance on Dr. Smith's say-so.



It had no reason to regret. The applicant, temporarily broke, succeeded in recouping a lost fortune, which, naturally, reacted to the benefit of the back that had assumed the risk.

The sac of a correspondcut's hand might be tikcuci to the same person a gestiang in conversation. The airy talker waves his hands and deals in generalities. It's pretty difficult to pin him down to moute items or specific facts.

"Oh, let's not bother about presyme details," you can hear him say. That same sweep of the hand is revealed in his writing. Bold capitals, flowing script. But the conscientions person is more careful of his facts. I connellmed to be extred away by his own enthusiasm. He weighs each point carefully. In talking, he is niggarily with gestures, when he uses them at all he makes them count. And his handwriting displays the same conservation; the same deuce to make each stroke tell. The letters are smaller, more carefully made.

THAT is the general graphological interpretation of size. Of coarse it is modified by other attributes which the trained man takes in as he follows the words.

The slope of the writing is supposed to be an instex of the affections. The graph-ologist regards a seventy-degree slope to the right as about normal; that possessed by one of a kindly, loving, generous disposition. Further to the right shows an excess of emotion. The more it tends to vertical the colder and the more calculating will the subject be, until the disagreeable, heartless nature is reached in the backhand.

But here, more than any place else, the warning is given not to be too hasty in judgment. Frequently, it is eard, a person will write a backband due to suppressed emotions which are not permitted any outlet. A disappointment in love may, we are told, change the hand to a backward stant.

Some schools teach backband, and one

With the Countert regueste of fineste Gierwith

#### Long Loops Reveal the Man of Action

This writing of the Arctic eviator and explorer illustrates the graphologist's assertion that physical activity is revealed by the length of the lower loops in handwriting. Notice particularly the depth of the J and g. Great enthusiasm a indicated by the studing of the down atroices. The sample capitals above an artistic side to the man. Intuitive sense is betrayed by separation of the letters

who has learned the system may go through life studiously holding lainself to that style, especially when he is writing something that will be viewed by others. That diastrates a point graphologists are mosterit upon that the writing he spontaneous and unstudied, preferably set down when the woter is so full of his subject that he will be concerned solely with the idea of getting it down on paper.

Again, it is said, backhand writing may reveal so many of the knolly characteristics that its effect is more than offset But, when combined with undesimble traits, graphologists agree that it is the badge of otter coldness of heart

Rounded letters-you naturally think

of them as "babyish" agonly the indoleut person, one of little character. The writing has a decidedly unharried look about it, and should not be confused we are warned with creatar swinging letters that disclose a sense of rhythm. Sharpay formed letters—to the point, as it were are made by the measive writer. They seem fairly to scream. "I have something to say and I want to be quick about it." The person of acute perception, graphologists tell us, will have that angularity of hand.

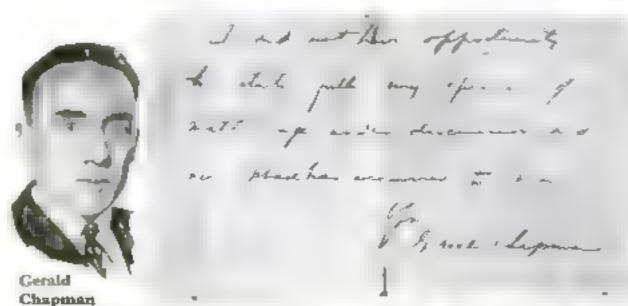
THE higher the capitals, speaking generally, the greater the writer's appreciation of lumself. There are other og is of self-esteem, but they will be taken uplater. A writer is further incrommated fithere are many flot rishes appendent to the large letters. Capitals that scarcely peopahove the small letters are employed by the too modest man. He, we are told, will

never make a good executive, lacking the selfconfidence so essential for such a post

A igor, passion sensioumers and sensuality, or their lack, are read in the thickness of the dum strokes of the pen. These range from the Dra. ethcreal lines of the senstive, spiritual nature to the broad, modely splotches of the sensualod, gournand or heute

What could be more natural than the graphological reading of with spacing between letters

words and limes as the descrable attribute of generosits? If seems reasonable enough doesn't if that a strigy person will crowd his letters together and start another word right on the heels of the one just finished, lest he be forced to use two sheets of paper where one might do? In the same way, the person fond of display, the man who in the old days of the pre-Volatead era would command, with an imperious excep of the arm, that all in the place be served at his expense, will be so extravagant in his chieography that frequently only two or three words will occupy an entire line. In a hand that others se deplays good attributes, grathologists may read. (Continued on page 121)



One of the last writings of the netorious bandit petated in prison shortly before his recent execution. Of minulation and craftiness are seen in the inperiod word, according to the graphologist, while the augularity of the writing displays

took intellect. Aggressiveness and mifopensonation are found in the crossing of the fig. Notice the general use of the Greek of indicating the literary tastes displayed by Chapmen even in the sest hours before his association

### Around the World in a Yawl



Spectacular Feat of 52-Year-Old Los Angeles Man Who Sailed 35,000 Miles, Alone, in Small Homemade Craft

By G. B. SEYBOLD

LEAN, tall man with besonded skin. thick, gray bear and quarzied bluegray eyes sat in the cabin of a little Newlanchored in Long Island Sound near New York a few days ago, and told for of one of the most spectacular feats on the Light sense in this generation. As he talked. he pushed a big needle through stoot canvai, repairing a manusail. A handwone bronse medal presented to him the right before lay on a table nearby

"Awareed to Harry Pidgeon," the inzemption read, "who completed a Yoyage of \$5,000 notes around the world, single banded, in the yawl Islander, thirty-four feet over all, taking three years, elevenmonths and thirteen days for the voyage." It was the coveted Blue Water Medal awarded for his remarkable exploit by the Crussing Clab of America, and he

has come from California to New York to get sta

TO TELL, the full tale, the inscription I should have said much more. It should have told how that man, who all alone had sailed around the world had started out on his croise when he was 52 venes old, and in a small boot built by Lizuself, how, a handlubber knowing nothrig of the sea, he had learned navigation by reading in the public library. It in ght have porified out, too, that only one other man in the world's history had performed a sordar feat—Captaia Joshua Slorum, in the minelies. But Captain Slorum was a resperienced may gator; and his boat, the Spray, was larger, too, than the latander

" I had always wanted to see the South Sea Islands Captain Pidgeon was sayrig. "I wasn't married, there wasn't any reason why I shouldn't go if I wanted to, so I went. When I started out, I dah.'t know I would get 'round the world, but I kept on going, stopping where I liked, and pretty soon it was closer to get home by going on than by turning 'round.

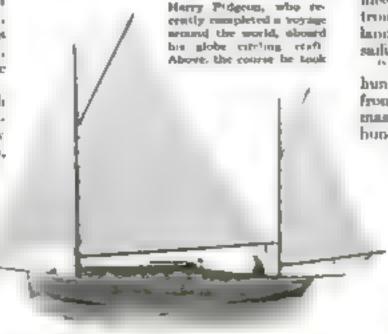
There was another reason for this extraordinary trip -love of

advent me

"I lived on a farm in Iowa until I was eighteen, he explained. Then I decided to go to Ca iforism. After a white I went to Alaska



Sailed the Seven Sean Alone



Harry Pidgeon's Islander, with full will, the 34-foot homemade bout which covered 35,000 miles in nearly four years

and British Columbia, and then came back to Iowa to see the folks. Being near the Mississippi, I built a house boat and went in it to the Gulf. Returning to California, I got a buckboard and a horse and drave to Mexico, then up the court to Canada. Pollowing a stay in the Sierra lomber camps, I got a farm in the San Jourgain valley

But the wanderer was not contented. So on Mormon Island in Los Angeles harbur he began bankling a yawi, after plant which he found in a yachting magnione. For a year and a half he worked on it. doing almost everything himself

"ILE a hollow log," some described his five-ton, V-bottom boat of the sea bird class. The cabin ran nearly two thirds the length of the boot and served both for living quarters and a storeroom for provisions and water.

In this strange craft, christened the Islander, Harry Prigeon sailed for Hawan in 1980 and returned some months later, having proved temmphantly that his bonsemade boat was seaworthy

A year later, on November 21, 1921, with three months' provisions and two sets of mals, he started for the South Sea

Terrific storms raged on the Pacific soon after he had left abore. These he mesed meraculously but he ran into trouble in the doldrums, the no man s land of the Pacific, a belt of terror for the suling vessel.

"It took me two weeks to go five hundred miles," he said. "That kept me from reaching the Marquesia by Christmaa. Ordinarily, I could make one hundred and twenty knots a day

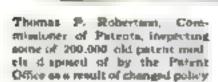
How did you manage at night?"

"Oh, I shortened down the sails, lashed the rodder, and went to bed The Islander made good time at night. One night she did over seventy miles. If there were squalls, I would wake up, trom, take down and red the sail in tentransities.

"Late in December, after fortytwo days at sea, I woke at dawn and through a porthole saw I a (Continued on your 117)

## Old Patent Models at 25c Each!

By Edgar C. Wheeler



M VX COHEN stood beside his pusheart at the curb on Orchard street and called out his wares

"Here they are. These famous inventions"
Thomas Edenson'
Who wants inventions:

It was a Saturday afternoon, and Saturday is the teening day along this per-Incessure atreet on New York's East Sule. Through the narrow way, between by drogy brick tenements and busement shops, a fumbled mana of himanity moved stoggaddy past a thousand pushearts that lugged the sputtered curb as for as the eye could see. Here, in endless succession were spread to the open air god dust all the common necessities and

luxures—everything, from above and harmers and starts to dolls and books and cheap jewelry

"Who wants myentions"

Elbowing my way through a crowd of men and boys that almost smothered Max Coben and his little eart, I came upon a surprison sight. There, heaped belterskeller on the rough floor of the eart, by a pile of working models: patented creations of inventors for last a century past!

THEY were gray with dist and scarred by bone. Most of them here little tags telling the name of the inventor and the number and date of the potent.

At the front of the cart and leaning against an "automata burglar alarm, lay a little machine tabeled. Hydronic Motor. William B. Casa, 1878. In be-wildering contrivance of wheels and cogs, levers and pulleys, all carved from wood with infinite patience. To complete it, pechaps, a struggling young inventor inhored in some dark garret for into the night, month after month. Perhaps, to



Each a Factor in Our Progress

Crowd eround a peddier's pushcart on the lower floor Side, New York City, enger to runming the working models of the once important intentions now being offered to the highest bidder. Here, in endiese succession, are spread the dresses and hopes of bygone inventive genius

perfect his idea, he braved the puops of langer and carried on through poverty and discouragement. And perhaps, in the cud, his rewards were only thwarted hopes and disappointment. Or did he eventually gain some degree of wealth and satisfaction? Who could tell?

A stocky man in shirt sleeves held in his hand mother of the models—a small wooden panel supporting an arrangement of terminals and wires. He read the label Circuits for Automatic Telegraphs. Thos. A Edison, Aug. 12, 1873

An original work of our greatest inventor, made, perhaps, with his own hands, by a prank of fate had ended up in Cohen's pusheart, there to rub against other devices long forgotten and to be maided over by a curious crowd. A grotesque finale to inventive effort. It seemed almost tragic. And yet, one could see that even among the most obscure of the models in that array were ideas which had been important and useful in their day. Now they were old and cast aside,

"Where did these things come from?"

I required of Cohen, the pushcart man I got 'em at an anction by Isesberg around the corner," and Max. "A kt of to got 'em. Such a business of punk!

"A man maned Lam. K. Lambought them from the government thomands of them from the Pater t Office. The auction man sold them around there on Broome street."

I recalted, then, how some months ago the autional Patest Office having abandoned its requirement of models of nover trons, had cleanest house of some 200,000 made s which bail accomplated through many years. The most famous of their were set aside for tunseums the remanater were sold at anctam to the lighest baddesc About 15,000 passed into the hands of a New York dealer, while the rest went to dealers in Baltanore, Md., where they were stored in a warehouse for future disposal. In New York the whole lot went under the hammer in a sale which netted some \$3,500.

The chief purchasers were pushe art mereloants and so thousands of the contrivances which represented agent its and countless hours of labor and for years had held a place of some digody in government offices, found their way to the curbs of Orchard street

"Two handred and fifty deshits I spent for Desistat!"

Cohen was saying, regretfully, and for what? People, they come and look but they don't buy. Why not? Bah! These inventors they break their heads to make things, and nobody boys!"

"What do you ask for them?" I ven-

"Ask" I ask what I thank I can get—maybe twenty five cents, maybe a dollar, maybe five dollars, and if I find a sucker maybe I ask ten dollars or twenty-five dollars. See? You know how it is. That a business. Hey San' he called.

A contless youth of some eighties venus sauntered up to the pusheart. 'San' directed the chief Cohen, "show has the rest of the stuff

Sam Cohen led the way down the street to a trapdoor on a level with the indewalk. He drew a long key from his pocket and opened the door, and together we descended a flight of steps into a black bole jainmed with goods of every description old clothes, picture frames furniture, books, all jumbled together. He switched on a light.

Inventions of Edison and Westinghouse Sold As Junk When Patent Office Cleans House

"There they are "he said pointing to a row of shelves at the far end of the cellar. The shelves were crammed to overflowing with inventions, thrown together in wild disorder. Other models

were senttered on the floor.

We climbed over piles of junk, and soon Sam was enthusuastically handing down the models, one by one, for my inspection. As he did so it was apparent that he like many another American vouth was fascinated by inventions. Each of the strange devices, as he held it in his hands, seemed to thrill him with its hidden my iteries and its comance. So, as we examined the models, we began to speculate on their origin, who had made them, how they worked, and what they were for

"Gee, but some fe lows worked awfollard to just these things together he and, tagging at a printing machine of heavy brass. "I may too, how many of the things are like what we have now

only not so good

I agreed. In more than one of these



The grandfather of the modern eibrator, a mechanical "rubbing apporatus" of 1971



An original work of our greatest inventor-Edison made perhaps with his own bands, sold at the resent suction for a few crats



A Predecessor of the Tractor

Detwing, from the original puters papers in 1856 uncerthed in the model sais, of a cart houled by a "stress man" controlled by levers, invested by two Newsrk, M. J., men.

contrivances, many of them crude and chanse, one could trace the early history of some common convenience or economy of the present day. Each represented a distinct step, however small, in the devel-

opment of a useful alea.

Street-car fare boxes, for example. from the dates on the tags, it appeared that about 1870 fare containers were among the most popular subjects for the inventor. The models were of many kinds and descriptions, from a little padlocked metal case which the conductor evidently carried on his belt, to a large wooden case with glass windows, strikingly like the "pay as you enter" boxes on surface cars today. But the choice one of the lot was a little tim cur, like a stagecoach, grantily pointed in red and yellow. Among the sides were tany cushioned seats, with metal funnels at the ends leading down into bones beneath. Apparently the passengers were supposed to drop their fares into the funnels. From such many undoubledly grew our modern automatic fare registers and the subway turnstiles.

AGAIN, in the pile we found one of the grandfathers of modern bathroom plumbing a self-draining wesletand, by identity the inventor. N. O. Bond by name, grew weary of the old earther washbowl and pitcher. So be took a board cut a round hole in the center and attached a metal bowl under the opening In the bottom of the bowl he cut a small outlet for the drain.

Then, too, we found one of the forefathers of the modern electric vibrator. This model was tagged. Rubbing Apparatus for Medical Purposes. Co. H. Taylor, 1874." It consisted of two clothcovered arms operated through an arrangement of levers from a hand trank at the side.

"bee how it works," and young Cohen delightedly. As he turned the little crank, the two arms moved up and down with a rapid rubbing motion.

There were door locks, many of them,

representing attempts of inventors to solve the age-old problem of keeping hurgiars out. Here were predecessors of the present-day tumbier locks. In one model, patented in 1877, the inventor apparently accomplished, by an elaliorate combination device morli lac same safeguard against lock picking which today is provided by a single key. Under the doorknob he placed two rows of little push buttoos, each bearing a number. To unlock the door, it was necessary to made these buttons in a certain combingtion. Finding the keybole on a dark right would be an easy job in comparison, but at coast it much have added something to the difficulties of the thick

BURGLAR starms apparently were another favorite. A typical model consisted of a signal board with rows of knobs resembling the stops of a pipe organ. On these knobs were labeled the various rooms to the house—"during room." parlor ""front bedroom, and so on, if a burglar opened a door in one of the rooms, a mechanism which neither Sant nor I could quite figure out would ring a bell of the same time pushing out the knob indicating the room.

Burnel under a fert heer distributor an 'improved sewing machine ' and a whiffletree, we came toor an early off at to create a noiseless typewriter. One would naturally think such an invention. would be somewhat complicated, as a matter of fact, it was the simplest of the lot. The model country they taken the inventor more than an hour to build for it was simply a cardboard case to cover a typewriter, with only the keys (represeated by thumb tacks) protruding. In doubtedly it deadened some of the noise. even though it must have proved impractreable. At any rate, it embodied an sien which later was made successful

Among the more curious inventions was an improved tombetone. The model bore no label, but, as Sam observed, it probably was the (Contraved on page 116)



By Edwin Ketchum

EFORE long, experts say, your ear may ride on tires of od! In place of indus-rubber from the East Indies may be substituted synthetic or artificial rubber from the waste of petrolearn wells, a new wonder of the chemists' laboratories. Just as chemists have ex-Inacted ayes, perfumes, flavors, from coal formerly wasted, so now they are at work to extract value in by products from petroleum. And clock among these is rubber.

One reason why the chemista are busy In this new field is the fact that today the world, and the I is ted States in purbeic. lar, is facing a critical shortage of crisic rubber. Largely because of the automo-

lale, we are using up rubber faster than it can be produced. In four years more, expects tell us, the world's demand will exceed the nonpry liv serie 37 (800) and quahad now so propose of a sign or com-Louis Lord the Lorted States with softer most of all for while we have only about one Six in the Court on Both helio we sussing a noch nada prant of the world's author,



Old lives on a Pacific coast dock weiting to be shipped to a factory where the rubber is reclaimed. Tests have shown that tires made of 25 percent reclaimed rubber average about 7,000 miles' service

what we use is grown in the United States; and Great Britain, the largest producer, recently has curtasled her ruli-

ber equorta.

To imagine what might happen if our supply of rubber should suddenly give ont, just stop a moment and make a list of all the things you see and use every day that are made in whole or in part of tubber. The first thing that occurs to you, no doubt, in the rubber tires on your car But now go through the list of your personal belongings. Begin with the heels on your shors, and add the garters around your legs, the buttons on your cost. the fourtain pen, craser typical penell and comb in your pocket, your shaving brush, your ramcout, and so on. Then enumerate the many ridder articles used in your home, in industry, in medicase and surgery, in radio and electrosty, and

The list seems emiless. In fact it has been estimated that at least 30,000 different articles have industribler as their basis. In less than a locardeed years since Cambes Goodyear showed bow to volcanase rubber, this product of the trupies has grown to be one of the vital necessities. of life, without which modern industry, commerce and transportation would be vertually paralyzed.

"HE increasing shortage has been felt I to higher prices. So critical does the situation appear that Congress not long ago appropriated half a mithon dollars to find a means of relief.

At least finir methods have been suggested by Paul L. Pamerton, chief of the

rubber division of the Department of Commerce. One is to make our present rubber supply last longer by conservation, a second is to attempt to grow our own rubber in the Southern states: a third is to find a aubatitute in common shrubs and weeds, such as malkweed, that produce latex, the white, sticky fluid which is the basis of rubber, of to recision old and worn rubber, such as old tires, and mix it with new robber. And finally, to make synthetic rubber

Some of the fascinating possibilities of this last named source of supply were described the other day by two well-known research chemists. Professor James F Norms, director of research in organic chemistry at the Massachusetts Institute (Continued on page 123)

## How to Keep Cool on Hot Days

A score of unusual ways our readers have found to keep comfortable in summer -An announcement of the winners in our "Hot Weather Hints Contest"

WHAT is the best way to keep cool in hot wenther?

We asked this question is our April number, and offered prizes for useful and ingenuous answers, believing that out of the thousands who swetter in the summer time there must be some who had found a way to best the ther mometer.

From deserts and baking practices and ordinary towns luve come handreds of letters offering breezes of comfort. Most contributors had a hard time keeping themselves down to one hint. Although in awarding the prizes only a single sing gestion from each letter could be considered, we are passing on a score to you with the additional limit that, when the temperature mounts, you select the one that seems to give you the most but weather comfort.

John L. Ginster, of Whitespore, N. Y., wins the first prize of ten dollars for the best practical hint with the following auggestion: "A hot shower bath followed by a hot drink, taken during the hottest part of the day." Thus, he mays, he has learned from experience gives immediate renef.

In his surprising method of obtaining coolness through beat, he is backed by science. The hot bath cleanses and opens the pores of the skin; the warm drink induces perspiration, which also cools off the body. The chief husiness of the akm, physiologists tell its, is not to throw off poison but to regulate the temperature of the body. The pores, opening and rios og, are toe doors through which the body heat most escape Heat opens then coid closes them. Plunge into a tub of very cool water and the pores close tight, shutting in the heat, with the result that after your both you feel hotter than

ever. Warm water has the opposite effect, opening the pores wide and letting the heat escape.

The hot drink helps in causing perspiration, which cooks you through evaporation. Much depends on the humidity of the our about you. If you are softening from day heat the more you perspire the better for the dry our will take up the

#### THE PRIZE WINNERS in Our Hot Weather Hinto Contest

First Prize-\$10 John L. Graster, Whitesboro, N. Y

One Dollar Prizes

Mrs. L. S. Oliver Maywood, III Ken Prince, Guoding, Iduho. Dr. H. E. Ingrach: Milwaukee, Wis. Mrs. Sarah Ross. Urbana, III Samuel Oliva. Danbury, Conn. Mrs. Clarence Berkheimer West. Milton. Pa.

Mrs. C. M. Smith, Percy, N. Y. Mrs. S. P. Fitch, Jacksonville, Pla. Major Carruthers Ford, Calgary,

Alta, Canada.

R. J. Hubbard, Orady, Ark.

Robert Davies, Jr., Denver, Colo.

Charles S. Taller New Orleans, La.

J. G. Van Hook, Burnade Ky

J. E. Campen, Norfolk, Va.

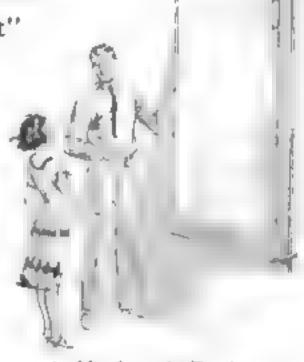
Edward H. Flaharty, Parco, Wyo.

moistive from your skin. If the are is moist, already saturated with water per spirition drops will remain on the skin surface and feel unconfortable. Most

> regions in the Lucted States, however have low humidity in the summer time so that the drink Mr. Ginster expanses is a good addition.

> A second suggestion offered by many has close connection to this idea of letting the body beat meape. This is to reduce the amount of beat in the body that has to be let out. You can do this by avoiding beat-producing foods.

Mrs. L. S. Ohver of May wood. Ill makes her suggestions concrete "Ent pranges, grapefrint and the seasonable frints," she neges, "nonstarchy vegetables and raw vegetable salads. Eat lightly of meats, hreads and potatoes, and very lightly of cakes, pies and candies. Our household has tried the method of keeping cool for several years and found it



An Idea from the Tropica

A damp screen of clock placed on college and hung over the windows lowers the temperature of a room considerably by means of evaporation

good. My husband, who is eighty two years old, stands but weather for better than those around us,"

In hot weather, vegetables and fruits should march at the head of the procession, for of all the kinds of fuel with which we atoke our bodies these produce least heat. Meats keep our body stoves coaring. Sugar, giving us heat in winter, is no friend in minimer.

Sweet dranks are one of the foods to be avoided. A magic necreasin sodu, dietribans point out, often contains as many calonics as a whole meal of meat, vegetables and bread

Wear cool clothing—is the next suggestion meaning clothes that are light in color, loose in weave and worn loosely to permit free circulation of gar,

ben Prance of Gooding, linho, says, "It is a well-known fact that fight consect goods reflect the mai's mys while the dark colors absorb them. Wear white, or light colors, to keep cool. Woolen goods form an air space which holds the heat in and cold out. Vegetable fibers such as linea and cotton let the air in and out more freely."

THE weave of cloth makes even more difference than the color, for loosely woven cloths permit better circulation of air, which is the chief secret of coolness. To carry off body heat and perspiration, our must move between the clothing and the akin. As soon as the layer of air next the skan has taken up all the heat and moisture that it can hold it should be poshed on and replaced by another layer. of fresh air. Enough ciothing to protect the skip from the heat rays of the sintouching the skin as little as possible, is the ideal formula. Araba who live on the desert keep comfortable by wearing a single garment of amouth white cotton so that air circulates constantly over the sucface of their skin. A suit of short cotton



Cool Thoughts Help, Too

A few suggestions for heeping cool. Think of rold subjects. Let cold water run on your wrists for a few minutes. Put a bin noteids window to cool the our coming into the house



For comfort on hot days weter light colors in clothes. They throw off the best, Dark releas absorb best and hold it to the body

underelething, covered by a loose white cotton short and trousers, a probably the codest European contume.

One suggestion is to cool the blood by bolding the wrists under the cold water fascet and letting water run over their for three or fostr minutes. This is the favorite practice of Dr. H. E. Ingrisch, of Milwauker, W. S., Mrs. Sarah Hoss of I rhams, Id. Samuel Oliva, of Danbury, Con. J. Mrs. Charence Herkhelmer, of West Milton, Pa., and Mrs. C. M. Smith, of Perry, N. Y.

If you want to take a comfortable sup in bot weather. Mrs. E. F. Fitch of Jacksonville, Fla., advises. "I se a water bag filled with cold faucet water for a pillow. Ice water is looked."

Another group of buts tells how to cool off your body by cooling off your surroundings. Since heat well-leave your body only if the temperature of your surroundings is lower than your own temperature, this is extremely important.

THE well-known plan of hanging well A sheets or towels in a room to reduce its temperature through evaporation has been modified in an nigemous way by Major Careuthers Ford, of Calgary, Alberta. Canada, who fixed up a rober lowel arrangement over the wisdows of his house on the marke. Any curtain material can be used, be says, but mustin in as good as any. The lower roller is in a shadow pan of water on the window ledge. "Give the curtain a spin through the water," Major Ford directs. and leave it alone until it is quite dry The se damp screen, he claims, proved so effective in British Guinea, where he trust it first, that a native servant fond of sleeping back of it took preumonia from the musecustomed coolness.

R. J. Hubbard, of Grady, Ark., maggests that you add a "cooling canvas" to your sleeping porch. A gutter trinish runs around the heads of the windows in his own sleeping porch, in which water is pumped on hot, dry days. "From this gutter," Mr. Hubbard explains, "is suspended thick, loosely woven univas. Water trickles down through this canvas all day long, and air passing through the water-souked canvas cools my porch and sleeping room,"

Late discoveries in ventilation show that comfort comes not so much from lowering the temperature in a bouse as in keeping the air moving. Many told of unusual ways in which they put their electric fans to work.

"Instead of churning up the warm air usade with an electric fan." Charles Stepard Tuller, of New Orleans, says, "I put a shelf outside my bedroom window and put my sixteen inch electric fan on it. This starts a cool typhoon blowing in through the arreen. I have reduced the temperature of a room six degrees in one hour, and thus cooling continues the longer the fan runs."

Robert Davies, Jr., of Denver, Colo., puts his fan in the cellar. "Our house is heated with warm air," he explains, "and of course there are several cold air pipes rooming from the cellar. I cut a small door in the main pipe, placed a small pun with nee in the bottom of it, and a small electric fan before the pag. By leaving the fireplace open, a most agreeable breeze

riceplated through the whole house.

H. C. Dickmoon of the U.S. Bureau of Standards, an authority on year lation, suggests that the most effective way to keep your house roof in hot weather is to apply some kind of insulation to the

rafters of the roof and then keep the after well ventslated. "In any case," be says, "ventilate your aftic well."

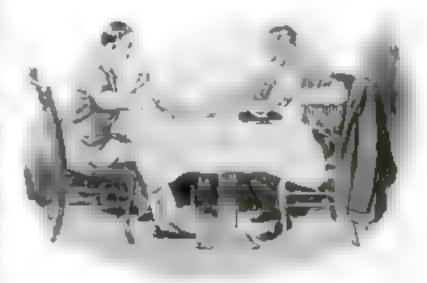
The general practice of opening the everything as wide as possible or the daytime, he contunies. "is usually a poor method of kerping cool. The house should, of course, he well ventilated at night, but in many cases it is desirable to close up fairly well in the daytime in order to preserve as far as possible the coolness of the night before Certain portions of the house, such as the kitchen, must necessarily be well ventilated in the rlaytime, but such portions can be closed off from the

In getting rid of the heat in the body the mind should not be forgotten. In fact, many put that first. "Keep calm." they advise. "Take it easy. If you're going to quarrel, do it in the winter."

Never allow yourself to become excited, worned, angered or heated in an argument," says J. G. Van Hook, of Bureside hy or in the daily routine of your work. The condition of the mind is a great factor in keeping cool. We often hear such expressions as: "He felt his blood run cold," If persons become impatient and nervous, we speak of them as being 'hot headed." Both of these are merely conditions of the mind."

HE ADDS this idea, which psychotolife the 'power of suggest on
if we are made to think of cold objects,
we become somewhat childed. I have in
mind a writer who, while describing a
snowstorm in Alaska, became so cold
that he was obliged to huild a fire to warm
limited although it was in andsommer.
This was brought about by a condition of
the mind. Decorate the walk of your
home and office with pictures of sleighing
parties, snow scenes, huge jeicles and
frozen streams. They will help greatly."

"After a desert experience of eight years in Needles, Calif., in the heart of the Mojave Desert" contributes J. E. Campen, now of Norfork, Va., "where the Thermometer registered constantly at least one has street and fifteen degrees in



Eat Nonheating Poods

Do not overest in but weather. Est green vegetables and case [rusts which produce loss best, and sparingly of roost and sweets which contain a high percentage of calories

#### Ten Ways to Keep Cool

- 1 Keep skin pores active.
- 2. Eat cooling food
- 3. Avoid sweet drinks.
- 4. Wear light, loose clothing.
- 5. Put wrists in cold water.

  6. Sleep on water bottle filled
- with cold water
  7. Cool off surroundings by
- evaporation (wet alreets, towels, windowscreens, etc.)
- 8. Keep the sir about you mov-
- Keep your mind cool, by being calm and unburried and thinking of cool objects.
- 10. Keep busy, and you'll forget the heat.

the shade, the best heat forgetter is to keep working. Don't try to force forgetfulness of the heat, but just become too interested in your work even to think of the heat. Above all things, shun 'heat conversations.'

"After all," writes Edward H. Flaharty, of Parco, Wyo., "we are not forced to live in Death Valley in summer where the temperature goes to a hundred and thirty degrees, or the top of Pike's Peak in winter, when the cold sends the mercury in our thermometers out of sight. In the sections of our country where the masses live, extremes are not beyond human existence or the masses would not be there."

Statistics compiled by insurance companies abow that, in fact, the summer months in most regions of the United States are the most healthful in the year. The death rate is much lower, there is fur less disease. Summer is the time for sport and enjoyment. Try this year to get your full share.

### Do You See All You Look At?



Study this picture very carefully for a minute and a half, then turn to page 120 and answer the questions about it

## A New Quiz to Help Measure Your Powers of Observation — Other Fascinating Tests

#### Do You Think Clearly?

WRITE "false" after each of the following statements which cannot possibly be true. Allow yourself two minutes, then turn to page 120 for your rating.

 He mused his car, but saved time by walking shood until the next car came along

The boy walking alone in the woods stopped suddenly, very much frightened at the approach of a trump.

 Standing in the shade of the tree, the people were sheltered from the hot can and managed to keep out of the rain.

4 After going beyond the repear shop at high speed his engine suddenly stopped, but he coasted back again to get it repaired.

5 Standing in the deep shadows of the garden, he saw the officer s shield flash as he paced up and down on the sidewalk.

They used the beams of the old house to build a new one, and left the old house as it was.

7 Blanded by the explosion, he rushed out for help, guided by the light from the fire.

THE drawing on this page, repeatured by converses of the Bureau of Public Personnel Administration, offers a test of your powers of observation. When you look at a scene, how much of it do you really see?

Sinds the picture for a mointe and a half. Then turn to page 120 and answer as many as possible of the fifteen questions about the accident which you will find there, without referring again to the picture. These questions have to do with such things as the time and place of the accident, how it impressed, and other pertinent facts that a policeman, newspaper reporter or other trained observer would be expected to see and remember Spend seven minutes on the answers.

As you study the parture you may if you wish make written notes of the things you see, referring to your notes in nuswering the questions. Then try the other two tests on this page, prepared by Dr. A. M. Johanson of the department of psychology. Columbia University

Here are fascinating tests that anyone can enjoy. In addition, you will find they will help you to get a line on yourself by measuring your mental equipment. They form one of a series of tests appearing from month to month in Popular Science Monthly.

#### Can You Connect Ideas?

NAME a class to which each of the following belongs; for example, "oak—tree." Count the time it takes (in accords) to complete the list, then divide the time by 20 to get your average time per word. See page 120 for your rating

oak	penny
meastes	dictionary
July	cabbage
shark	Rhine
quinine	murder
beef	dog
Cittioe	sparrow
banana	London
Atlantic	football
Alps	rose

## Incle Sam's Arctic Policeman

POPULAR SCIENCE MONTHLY



The Bear cracking its way through the slock ice beyond the Accele electe. Her bow is built to run up on the ion and amash down through it into the water

N AN ice field projecting from the shores of Kotzebue Sound, six menand three women are seal hunting. Wilaput a sound the great see pan ships away from the shore and out into the current that rushes through Bering Struct and on to the Pole. Their hunting finwhed, the men and women-ame black dots on fifty square unles of ice-pack their seals and start for home. They reach the edge. There is no village, no keed, no friendly iglore nothing but water. No one on the land has inseed there, un kayaks have put out to rescue them. There is nothing about apparently, but death in the sey Arctic corrents. Frantacally they start to toold a snow house for protection against the encoming

Down below the horison a gray-white the p is criming lessurely along the coast The lookout spies the black dots on the e field and abouts down to the deck "Men admit on see ". The stop leases nhead at fail speed and soon overhauls the floating ice. The rine castaways are rescated and brought back to their valuage on Kotzebue Sound

The slup is the old wooden builted States Coast Guard cutter the Bear, which for therty-mine years has been the only law, the only policeman, the only physician, the only hospital, the only food supply. The only representative of Unite Sam north of Nome, Alaska.

Her home port is San Francisco, but from the beginning of July until October

she patrols the coast of Alaska and the lower Agette ocean covering in her yearly crouse more than 10,000 miles. In the last thirty-nine years she has covered at least 400,000 miles or nearly stateen times the distance around the world. In that long period ahe has naved thousands of persons from death by starvation, freezing, disease and intertribal war

Unsided, the Hear has made vain the least of the freeleasters that "there is no law north of fifty four The channels and the open sea trancestian on the south to Demarcation Point on the north she has made as safe as the best policed city in the world. To the E+ kuno she has insured

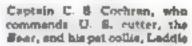
freedom such as prevails in the United States, and has made his property safe both from dishonest whites and from native raiders from near-by points on the Sthertan coast.

On this lookout at Point Bar

row Alaska men watch day and night for the arrival of the Bear.

with mail, medicine and supplies

And now, after therty onne years of unintercepted duty, the Bear is sailing the morthern sens for the last time. When she



returns at the end of her fortieth crime this fall she as to be retired from active service and her place taken by an all steel ship of much the same type,

While she was making preparations for her last voyage, I vinted her in her berth in the Oakland estuary on San Francisco Bay, After having been allown over the old ship and learning comething of her work, I asked her commander, Captam C S. Cochran, if he did not find the long trip through the dismal northern sens dull and tiresome,

"No. he replied, seemnight amazed that I should consider such a thing possible "Why, we live four or five months packed with adventures every year, From the time we leave the Commissioners court at Nome early in Jane until we stop there again on our

way home in October, every day a filled with thrills. We guard the natives and the whites who live along the counts of northern Auska, and look after the interests of the United States. We protect the scal herds of the islands and the remideer berds of the land. We feed the hingry, beal the sick, bury the dead, marry the living, and divorce them too. And we publish the emminal when we catch hou Always there is something new, something out of the ordinary, something existing."

Captain Cochran then went on to tell me of some incidents that constantly are recurring and that make the day's work

na absorbing task

"Some years ago we were near the mouth of the Colville river, east of Point Barrow, northernmost tip of American domain in the Arctic, when a skin kayak came bobbing over the rolling sea. In the jargon of the coasts north of aixty the beatman told of a spirit that stalked through his trabe, kilking ceaselessly. The Bear a rehored, and the ship's physician with his assistants went ashore. When they returned, an epidemic of smallpox had been halted and the Eskimo given a new lease on life.

"CRUSING slowly along the shores of more mathern islands, below the Corde, the man in the crow's nest not infrequently reports a motor schooner, all sails down, half hidden behind some islet. The wrappings are taken off the rapid firer up in the bow and we round the island just as the schooner starts out. A shot across her bow brings ber to, and boat and crow of seal poschera are taken to None for trim.

"From the top of an ice mosted near an Eskimo village, a queer signal is often flown. It consists of a pair of for trousers and a woman's cause skirt. The lookout on the Bear sees it. The steamer comes to a stop, blows her whistle, and from six to fifty knyaka put off from shore. A man

and woman wish to be murried posses of the repress. A local abused and
or the re-deck the reriedy as per use of send
tried cuterful root is
loss. When the explained
ruses of a pure of purish
and he other a dect, a covorce is snoght, uncle if
there are legal grounds for
ity it is granted, signed
so a cd and del vered, right
here on boars.

bear which has gone to t and needs kitting. Then there is a manhog party on store, and the skin of the bear goes back on board

Men and women with he so hands are broad to as stip by their relatives and their reports made in the flusting hospital of the Bear taken back home. Lake the Churese, the Eskimo never forgets a kinduces, and myself and the other officers are overloaded each year with gifts from those we have helped the year before.

"The only mails go north and come south each year on the solid decks of this

sturdy old ship

"At Point Barrow, the northernmost tip of Alaska, there is a lookout station, kept by the service for the benefit of traders and natives. As the time for the arrival of the Bear approaches, men are chosen to remain day and night in this lookout so that, when the patrol ship comes in the village may send out a fleet of boats to need her and escort her to her anchorage

Late in September, some years ago, the bear, on her way house, was near Point Barrow when a knyak approached from the shore. Smoke cried the boat man pointing toward the Pole. The lookout in the crow's next found a wavering column of shadow about twenty-five miles north. The bow of the steamer was swung around, and back we went, smashing through alush ice, until at length the outlines of two ships appeared beneath the smoke. A dog team was sent out and before morning reached the halls of two whaling ships, frozen in solid, short of food, prosumed by their own during in remarring too long beyond the Circle.

'The dog team traveled back and forth notil food enough to last through the winter had been transferred to the whalers' decks. Then once more the Bear resumed her course to the warmer waters of the Pacific. So you see we have

seldom many dull, uninteresting stretelaes, he concluded.

The Hear s error numbers about fifty, and among them they earry a dozer pets and mascots, ranging from Lastere, Cantain Cochran's snow-white colar to a large and busky adev cat, which adopted the ship one evering four years ago, as she lay at her berth in the Oakland estuary. Besides these, there are other dogs and cats, a goat, a small black bear, an occusional polar bear cub, numerous seals and walrases (world that are small) and now and then some of the larger sea birds, which land I sabled on the steamer. where the good doctor fixes them up and keeps them until they are able to take Wing again.

Though the Bear is built entirely of wood, she has survived storms and ice james from which she has had to resent troa vessels. She is so had to resent troa vessels. She is so had to resent she can be driven up on the ice, where he weight smashes through to the water beneath instead of leaving to cut straight alread into the ice, as the steel-proved iron vessels do. Triple is eathed with six nock planks of our the Bear is one of the few remaining examples of a type of ship construction which has passed away.

AFTER she is retired, her work will be arrived on by an all-steel. Diesel-driven schooner, of approximately the same size, which is to be ready by the spring of 1987. The same captain and the same crew which have been taking the old wooden patrol steamer north every year since 1914 will be in charge of the new ship, which will have the same name as

the retring veters. So, a though the between the least of the least with the least of the least work with the least of the

To the low Hear ton, will go the outered whost is been and in point bear which now looks out from beneath the bowsprit of the present step. When the old he converted into a processar for he constructed of the construction of the one one of the construction of the object of the obje



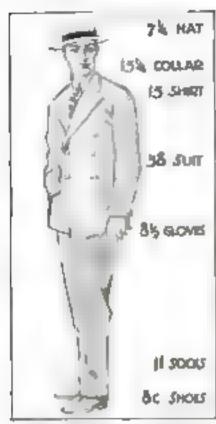
The Bear's Boat
The route taken by the
Bear in her yearly
patiol of Un-le Sam o
o of seen present one
She has the en a
Rea 10 000 mores rath
sometimen in he saw
There's none years



Some of the crew of the Sour with five of the dozen or more pets of many different species that are always carried on board the catter



## Next Time You Buy Clothes



Mr. Average American

OCLD you determine your own clothing sizes?

If you deln't know the size of your shoes, could you buy the right pair of socks for yourself simply by measuring

the length of your foot? If your wife should go shopping tomorrow and volunteer to buy the gloves you've been needing, could you give ber ine correct size? Ten to one you'd squat at your outspread hand, pump your memory-crank to recall your usual size, and finally give it up with, "Oh, about 714, I guess!"

Now, clothing design, when it comes to sixing and measuring to meet the varying proportions of the human figure, is an exact sesence. The proportioning of men's suits to varying beights and girths, for example, is about as scientific an operation as anything that has to do with the making of your clothing.

A man recently sent an order by mail in a New York clother. He was going on a husiness trap, wanted a size 38 suit, said he measured 36 mehes around the chest, and added that he was of normal build. The elother had his doubts, but rushed out a regular 38.

Eventually the suit came back, with an magnant letter It seemed that Though the chest fit was perfect, the wast length was too short, the alceves hung a little below his edows, the trousers exposed more of his violet socks than even I is best girl liked to see, and the pockets were so high that he had to crook his arm to get his fingers in them!

THE fellow was taller than the aver-A age, a circumstance he neglected to state. He was of normal build, yet he was far from being the "regular 38" on which the clothiers base their measurements.

What makes a man a "regular 58"? I put the question to Harry Simons, editor, teacher and clothing designer, who knows perhaps as much about the seventific measuring of men's suits as anyone in the country.

"If a man is 5 feet 8 mehes high," he

Remember That a"Regular 38" Suit May Not Always Fit a Man with a 38-Inch Chest-How to Order Haberdashery

By LIDDA KAY

said, "and measures 38 inches over the vest around the chest, and \$4 meles around the waist, he can consider himself an average, normal figure and a regular 38.

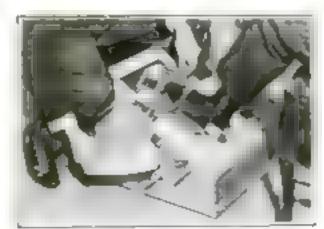
"Then, if he is absolutely regularly proportioned, he will also measure 1314 inches around the neck, and have a warst length of 1714 inches. These figures are not guesswork. They are based on a study of the science of human proportions and on actual measurements of thousands of men.

"The average American we consider, for purposes of clotlung design, to be 5 feet 8 mehes tall. Thus tallies almost equetly with fact, for the American soldiers in the World War averaged 3 feet 7 14 mehes in height

IF A man is 3 feet 8 inches, or a little more oralittle less, he ma'regular, and we have our regular set of measurements for him. But if he is 6 feet or over, he is a 'long,' and if he is 5 feet 4 or under he is esther a "short" or a "stub." All three need three different acts of measurements.

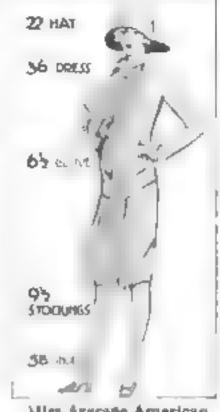
"Our scale for different heights is based on certain proved facts. For every inch a man grows over & feet 8 inches, his want length increases 14 inch, his sleeve length 14 inch, and his leg length 1/2 inch. Remember, I am speaking of averages and of regularly proportioned figures. In morety cases out of a hundred, the seat measure is 2 inches more than the chest measure. A regularly proportioned man with a 38-meh chest, however, will usually take a 1334-meh collar. For every unch increase to the chest, the neck usually increases 14 inch, irrespective of

"As soon as a man's waist measure equals his chest measure, he goes into the



An Automatic Shoe Fitter

This asgessions attribute recently devised for ust in shor stores, not only measures the foot automatically but stamps a number on a card, enabling the salesman to pick the correct mat. Here the card is being inserted



Miss Average American

"stout" class, even if his waist, is only 56. And 'stouts' require still another set of measurements.

People ask me if men are getting taller, thanner, stouter, or shorterjudging from the scales of measurements.

'Well, men are getting smaller waisted. Height and chest measurements today are about as they were sixty years ago, as the Civil War and World War records show But twenty years ago a regular 38 called for a 33 waist, whereas now it is down to 54 and is even approaching 83.

"Where you live scenur to decide your want line, too. The middle westerper has one inch more at the waist on an average than the easterner, particularly the New Yorker. It isn't that the middle westerner spreads, but the poor easterner is 'congesting I"

In for women's dress sizes—

Theoretically, the woman who is classed as the perfect 36" measures 30 nucles around the bust. Actually, the "perfect 36 dress is made for a 38 or SN 14 bust. A man measures thus and thus, and that's that. A woman changes her figure, by different methods of corsetting, to conform to the lines in vogue at the moment.

TERTRUDE EDERLE sw mining Gehampson, is at least one woman who finds difficulty in conforming to Diclinesia vogue at the moment. Miss Ederle wears a 36 swimming suit, but if she wants a dress or blouse that will span her shoulders and approach within spenking distance to her wrists, she must buy a 40. Her powerfully developed aboutders are plainly not those of the "perfect 30."

"No, the reducing wave om't changing the average woman's dress measurements at all," declared one persumstre manufacturer. "Women are gelling falter, if anything. They are riding around in automoliues too much. They have entirely too little to do!"

As proof whereof, one dress manufacturer recently added 2 inches to the house of him 19-26 (Continued on page 124)

## What All Modern Industry Owes To

ELI WHITNEY

How America's Pioneer Inventor, Robbed of His Cotton Gin, Made the World Rich

By Robert E.

Martin

IN THE year 1792, at Mutberry Grove, a broad plantation near Savannah, Ga., there hved a woman of motherly hospitality—the widow of General Nathanael Greens of Revolutionary fame. Into her home she had welcomed a tall young

man of 27 years who, having just graduated from Yake College, found humself stranded in a strange city, penadess and without friends.

The young man's anisation was to study law, but he was also a mechanic of uncommon

shalt. While he accepted the widow's kindnesses, and while he contained his studies, he based himself at old jobs about the plantation, repairing facts insplements and furniture, and devising ingenious playthings to delight the children of the house.

To Mulberry Grove one day tume three distinguished visitors, officers who had served under General Greene in the Revolution and who owned paratations in another part of the state. As they say in the great parlor chatting with Mrs. Greene the conversation turned to the sorry plight of southern farmers and the dearth of profitable crops.

"Tis a sname remarked one of the officers, a Major Penaleton, "that we cannot make cutton growing pay Everywhere the short staple cotton throves, yet the labor of separating it from the seeds takes away all chance of profit."

"THUE," repend Major Forsyth.

For one man to clean a single pound of cotton is a good day a work. A pity there is no mechanical device to do the task."

Mrs. Greene interrupted.

"Gentlemen" she said, with sudden inspiration, "why not tell your needs to my young friend, Mr. Eh Whitney? He can make unything."

She led her guests to a small workshop in the basement, where they found the student-mechanic at his bench.

"Mr. Whitney," and the widow, introducing the officers, "these gentlemen want you to make them a machine that will separate the seeds from cotton, and I



The Machine That Made Cotton King

"Bert" cried Whitney. "It is finished. It does the work!" And Mrs. Machannel Greens, widow of the Revolutionary here, and her plantation superintendent stood spellbound, watching the rate cotton closest by mechine

have told them I believe that you can do it for them.

Whitney staged in amagement,

"Why," he exclaimed, never have I seen cotton nor cotton seed in my life."

But for into the night, after the guests had departed be pondered over the unusual request. From boxload his delight had been to contrive and fashion new things with his hands. Now, his very guidance of cotton loved him to match his skill against the problem it presented. Perhaps, too, here was his chance to finance his stody of law. A machine to pull the seeds from cotton. It seemed not impossible. At least, he could try. But



Whitney's original model of his cotton gin, now on exhibitron at the Narsonal Magram, Smithsonian Institution, Washington, D.C.

first it was necessary to

NO MAN

er fight against disheartening odds than 5h Whitney,

pioneer American inventor Though his cotton gin cabered in a new epoch

in industrial histury, to hant it brought only pov-

erty, scorp and bitter disappointment

Early next morning he rode into Savannah, fourteen nules away. In varia he searched the warehouses for a sample of cotton, for it was out of season. At last, on a river book field to the

see some cotton.

wharf, he found a handful of the stuff and with this hurnest back to he workshop. In don lanters light he set to work, examining the fibers and pulling their away from the seeds with his fingers. As he do so, the stea of the machine grew is his mind. He would make mechanical fingers perform the

work of human hands.

The flogers, he decided, should be of wire. They should be made to eatch the white fibers and draw them through a slit too narrow for the seeds to pass. The sieu seemed simple enough. But would it work?

Pire of all, he needed wire. A rother scarch of Savaniah proved that not a scrap of it could be bought. Whitney, however was resourceful. Or the plantation be found a package of wire that had been intended for a rid enge. This be drew to the right thickness for his parpose. Next, he needed tools. Those in his workshop were madequate for his needs so he fash oned new ones with his own laps s.

For eight menths be labored day after day, sharing his secret only with the noming who had before odd in mand with Plotens Mider, the plantation superintendent. Then, one afternoon in the spring of 1783, he called exertedly for them to come and his shap.

"See" he med. "It is finished. It

does the work12

On the bench before them they saw a small wooden box, about two feet high, fitted with a hand crank. Into an opening at the front of the box Whitney began feeding a quantity of raw cotton, at the same time turning the crank. They saw the cotton pass between two parallel cylinders, one fitted with rows of sharp brooked teeth made of wire, the other with a series of brushes. As the cylinders revolved, the teeth caught the cotton fibers and dragged them through a narrow

grating, or grid which excluded the seeds. While the seeds dropped to one aide, the brushes entried the cleaned

colton to the other.

Such was the world a first collingin a mach nedestined to do the work of a thousand men to open in Lions of acrest of land to profitable cultiva-Lam, to revolution ze the dress of peer and women every where, and to add notions of dollars in wealth to American industry and commerce buch was the povention which made it possble for my today to have cotton in a thousand forms and labries in the vast quantities we require and at prices we can afford to pay.

RS. GREENE was juln-VI lant over the success of Phonesis her young friend Miller saw visions of speedy raties. Immediately be offered to Eli financial backing, and proposes a partnership. But little aid either of them know that the invertion they saw before them, while it would lift thousands from poverty to prosperity, would bring to the genus who created it only the dregs of want, scorn and bitter

disappointment; that he would live to see the entire fruits of his labora stolen from hor hands, and hunself revoled by the

public which he eigebest.

Nor did they dream on the other hand, that out of ics tragic struggles would eventably consensather and ever greater contribution to the world. They could not foresee that Eh Whitney would go down in history not only as the pioneer American inventor, but as the father of al modern adostry. For it was White exwho later conceived and applied for the first tone the idea of standardized interchangeable parts to ma rafacture, thereby revolutionizing the whole course of commercial enterprise.

LL thus was to come but not until A the courage and persistence of the young mechanic had been tried to the limit through a dozen evil venes.

At the moment of that first demonstraton, lowever, the cotton gap seemed to

offer nothing out promise.

'Wonderfal' exclaimed Mrs. Greene, as she watched the seeds drop beside the little box. ' My friends must see it work. Mr. Whitney you will be famous?"

Quickly she ordered the erection of a small holding in which the new wonder noght he displayed. Then she invited influential friends to Midberry Grove to

inspect the machine.

They came politicians, statesmen, country gentlemen and planters—and they marveled. What they saw was that a little mechanical box smaller that a truck could clean more cotton in one day. than a slave could clean by hand in many months. They saw, too, that this magic bog would treble the value of their lands overnight.

The news spread like wildfire. Everywhere it aroused a desire to possess the secret of the strange machine holden



Lineal Descendants of Whitney's Invention

They are power driven, and various refinaments have added to their efficiency, ert these modern cotton gine in principle ore the same as the first little mechine feshioned by Eli Whitney in his bearment workshop in 1793 to invention which made it possible for an today to have cotton in a thousand varied forms and fabrics, and in the yest quantities we need each day

> behind locked doors at Midberry Grove. Men began to whoper, and to scheme.

> One midnight in June a hand of black figures crept stealthdy upon the plantation. The great house was in darkness. White Eli Whitney slept, perhaps drenusing of fortunes to couse, the figures moved sw ftly to the lettle outbuilding. A sudden graphing and wrenching of splintered bounds broke the might stillness. A dog barked. The shadowy forms shirt away. Then all was silent once more.

She's a Real Water Sprite!



FOR eighteen months Man Maxie Meitzner, arventeen years old, of Riverton, N. J., a licensed diver, has been doing diving work on the Delaware river. It is believed that the is the youngest woman engaged in the unusual business.

When Eli awoke the next moroung, his first thought was of his model. That day he was to add the finishing touches, and then he would apply for his patent. In high spirits he h irried out to his work. What he saw made his heart stand stal. A spiratered foor of the I ttle benefing suggest open on its larges, and, within, the room was empty. The cotton gin was gime!

At that inquent in an old barn a few males away, half a dozen men were gathered exretedly about the necsterious little box examining its parts and studying its operation.

THE accret was out. As Flu stood gazing into the empty room which a few hours before had beld the ravertion on which he had labered so long the could senreely believe h yown eyes. Gradually there came upon a in the fill realism tion of the odds that were set against in a He mast begin This time he must battle with thieves. Not only must be face the problem of manufacturing and marketing his machine, but it doing so he nust compete with his own

product! The task seemed all but hope-

Should be attempt to go on, or should he surrender his povention without a struggle and continue his studies toward

hts chosen profession\*

In the end, the audienous theft served as a challenge to Whitney's fighting sparit. He determined to take the gamble. With funds astvanced by Phoens Muler he Interest to New Haven Unio, to get his patent and begin the marrifacture of entton goos, while Malier remained in Georgia. to distribute them.

From the autort the battle turned against him. Even before he could complete a new model and apply for a patent. a number of cutton gars, copied from his miser from were in profitable operation.

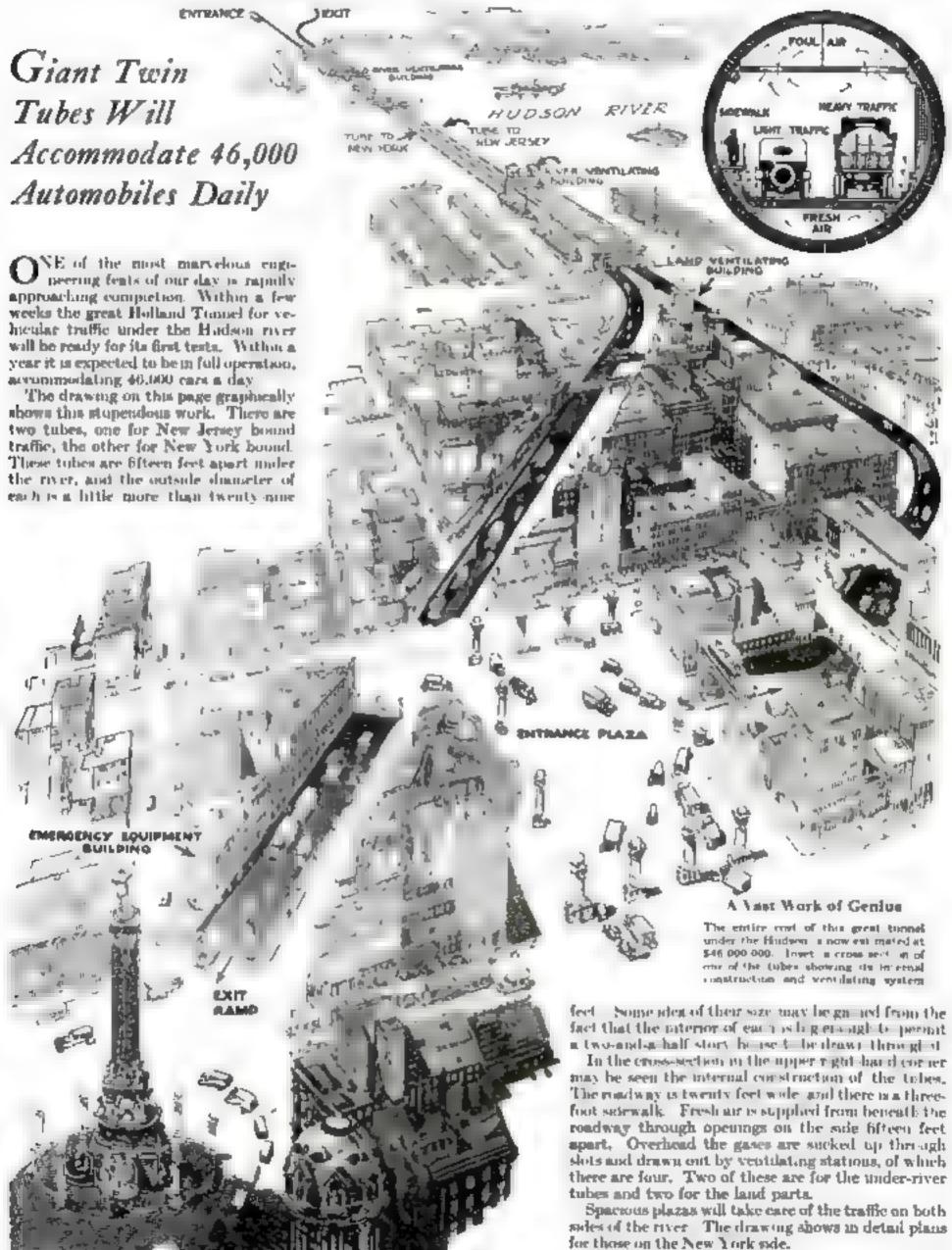
" The people here are guinting hard for cotton gains, and they care not who supplass them "wrote Maller from the South

My workmen have fallen viet ms to an epidemic of scarrel fever which is raging here 'replied Whitney from the North. "I can do nothing.

BUT he kept on. A year passed and then with the first machines from the shop he had established in New Haven. Whitney journeyed the road back to Georgia. To his titter amazement, he found that those who had robbed han were being accepted by a money mad public as the legitimate operators of cotton guis, while he, the rightful inventor and owner, was regarded as an intructer and sourper.

Everywhere junes turned against him. Intumdated witnesses refused to testify in his behalf. The public linighed in his face. Weary, discouraged, but still unbeaten, he returned to the North, this time by packet. On the way he was shaken by fever. And when the ship (Continued on page 195) reached New





The underground land entrances and exits will be more than half a mile long on each side of the river.

Do all outside pointing but he core the walls are completely dry before starting to paint



Make thorough repairs on the roof. Replace all mining or rotted chingles, and stop leaks



Weterproof with the the outside cellar walls, and cover with dut no sun will not mail it



Apply weather stripping. Use anter box in cutting it. Get in your supply of winter cool



Get the heating plant ready. Put up tracke pips. Clean the channely from the roof down.



Take down screens and screen doors. Rules up the leaves around the bouse. Start furnish

# When to Do

## Upkeep Costs Can Be Cut by Making By John R.

PREFF is a little brother to Overhead. They readevious par whom most people prefer to ignore. Yet in various gauses they intrude themselves upon us all the time and help to keep our pockethooks lean. Not content with their legitimate prev. they porchichiab, as it were, the simplest home. Something ought to be done about it but what? The trouble is, it takes a professor to differentiate between these clever crooks, and Sherbock Homes himself would be put to it to detect them in the act.

It is possible fortunately, for no to use up the more barefared activities of Brother I pkeep and to checkmate him to a large extent. We can anticipate his raids and see that he doesn't get away with the house and lot, too. Doubtless Overhead is responsible for interest, taxes, insurance. We can't help those items, usually. But it is certain we can more muse the leaks and losses that I pkeep inflicts from season to season through determination and depreciation.

The advantage of home owning over renting in variously estimated as equal to four to see months rent saved. This inelades every factor. Deprecution proper or the rost of physical agazen, is often estimated at one percent year's of the house value. That is, on an 490 000 house, \$80 worth of repairs are needed each year. Such an estimate is a rough guess for much depends on the grade of dwelling and also the ecction of country. A pkeep to less on a good house than on a poor one. Then there is the element of timely care Furthermore, the cash outlay may be reduced by half or more if the owner there has own work.

It is a good thing to have a month by month schedule of repairs so that the various jobs can be autospated and done in the proper season. A midwriter bluggard is no time to patch a leaking roof nor is the fly period statable for repairing screens. There is also the point of service and economy in buying equipment as a heating plant, in the off-season, and like-wise in biring certain work to be done

The following is my idea of a repair schedule which may be modified by the reader to aut but own local conditions. We start with the current season.

JUNE Prepare for general outside panding in dry weather. After rain, give the walls two or three days to dry out. A little dampoess is permissible only on shingles when you want to save stain. The most enduring stains for shingles are red, green, and gray. To burn off okt paint from woodwork is the practice of professionals, but it is slow and fire-hazardous for the amateur. The a pulty knife and wire brush to remove any scaly or fisking surfaces.

Put on a thin cout first, follow with a

heavier second after desing and add a thord for extra fine work. Just one medican continuous seed, in a with whate lead, a little torpentore, and a mate of dever. Lamphlack added makes are grav shade desired and a triffe of it makes white lead whiter. The enduring colors for in taile work are whote, geny vellow. For taside, amost any color will hold.

The professional louise painter likes to not his own because it goes farther but even he admits that some braists of ready-noted point are first class. But a couple of good brushes, and between jobs keep. The bristles immersed in water languing the brushes by a wire through holes in handles.

Clean out the eastern, if any. Unharber the lawn mover. Do any coment work rain is good for it—patching or renewing walks. Give mosquitoes no breeding place or brickens, etc., outdoors; oil nurface of water in point or ditch.

JULY. Make thorough roof repair in place of eacher makeshifts. Apply hand roofing to beaks or eat resurface use plenty around character and centralized to a wide conting brush saves the back and speeds the job, enabling one to use both hands on the bandles where a low-pid hed roof perm to standing. Hack is the most end mag and cheapest of the asphalt materials, but red and green may be had

On for roofs, holes should be soldered? but if the fur is so far gone that solder won't adhere, we must apply roof cement, which is a thick maxture of asphalt and ascessos. Where expansion has split the for seams, most steeps moderneath, then not used solder. Pately point or replace flashing. But in new slongles as needed, and apply roof stain if desired.

It spect gatters and leaders for patching, painting or replacement. Extra got ter spaces may be needed on ter-forming north side. This is also the time for any carpenter work on pillars, steps, and porch above or below. Where there are stains of dampaess, the wood may be decayed; poke it with a screw driver or something and find out. Interior decay soon travels to the surface. It may be checked with highed asphart, creosote, or paint,

An old shingle coof that is tight the rest of the year may leak in a sudden

IN THIS article, one of a notable series on house building and home ownership, Mr. McMahon tells you how to keep your house in first-class condition. Next month he will discuss house exteriors.

# ODD JOBS

## Your Repairs on a Monthly Schedule

Mc Mahon

July shower, because the dried-out shingles crack and separate. While not semous, the indommer leak gives to a hint of the need for future renovation.

Al'GIST Thuseliman of the dry season to best for excavation, whether of well, septic tank, cesspool, drain or water lines. Not only is digging easier, but you can tell now whether a well is dependable or merely bolds surface drainnge. Also, earth walls do not now cave in, and may be used for one side of concrete forms. Again, it is easier to detect a leak in a drain or water line.

We may likewise do all kinds of general building without much need for weather protection, thereby saving material and avoiding damage. If foundations or cellar walls need tarring or cement plaster outaids, do it now. Clean up last mouth's jobs of outside painting and roof re-

7444

The kind of tar mutable for waterproofing the outside of cellar walls is a hard substance that must be beated over a fire. Yet a hot min will cause it to run after it is applied, therefore fill in with earth against the wall as completed. The same material is a good decay-preventive for wooden posts in the ground. A brush once used in the beated tar is about done for. On the other hand, liquid asphalt may be readily washed out of a brush with gasoline.

SEPTEMBER, If a new heating plant of required for the coming winter, matall it now before the rush. When everybody is clamoring for furnaces and service, was may not be able to get either or van may have to necept a sink itate along with lasts inferent establishme. Look ruto all the atest systems and devices, including the oil burners. He sides the orge improvements in the heating art, there are small features of value, one water heaters, that may be added to almost any furnace. Fix up the coal bin and don't delay putting in the winter supply of fuch.

Unless done in the spring renew floors, whether with new material, buoleum point, variath or wax. To prepare an old floor for painting or variathing is quite a job, but it pays to spend time on the preliminance. Use a plane, or an electric machine to level and smooth the surface. Bud spots may be sandpapered. Fill large eracks with putty or special compound.

Apply a filler cont, then follow with the final surface, allowing plenty of time for drying out. If the woodwork of a room is to be stained, painted or enameled, it should be done before the floor. Fancy work on trim means four or five conts with anotheapering between. Most people find enough labor in two or three conts.

Apply weather stripping to windown and doors while it is still comfortable to have them open. This job, bendes mying a couple of tons of coal each year, stops the annoyance of window sattling in wintry breezes. Use a miter box to mw stripping, have materials bandy at each window, and it is not a hard chore. Metal stripping is best, but wood with subber insert lasts very well. Felt stripping wedged into cracks with a putty and will do for shed windows.

Now is a good time to fix up that aftice room or extension workshop with fiber board, plaster board or something else that will make it may and mable. Do you need a cold compartment in your cellar for front and vegetables? Make a little room with concrete blocks or double thickness boards with air space, building paper and a layer of tar roofing on the cold side. The ceiling should be insulated, too, and there should be at least one window for light and rentilation.

OCTOBER. Get the heating plant ready to fire up, first cleaning the chimney from the roof down. With an inflammable roof, and soft coal or wood foel, it is persons to neglect the chimney. I se a wire brush on a pole or rope, and after cleaning see whether floes or brickwork need repairs. By positing up loose brocks with cement and perhaps replacing chimney cap of concrete, we may avert danger and postpone complete reliading. For this job, dampen old brickwork thoroughly, use a good mix of cement, protect from frost and dry out for a week. Reinforce chimney cap with heavy wire mech.

Connect furnace amoke pipe—new if required. Cement smoke pipe into flue a thin weak institute rement, molded nabeston or half and half. This is a gustight safety measure I've used for yours. And it is well to have asbeston board or other fireproofing on beauna directly above the furnace.

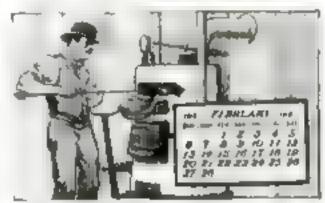
Flush out steam boder and refill with water to proper level. If the outlet faucet is rust-choked so the water won't flow, take it out with a wrench and clean. Cover all steam pipes with asbestos packets and the cloows with asbestos powder moistened to a putty. For the latter application, it is best to have heat in the pipes. If you have difficulty in getting steam pipe jackets, do not wrap on asbestos paper and wire (Continued on paper 118)



Fix down of garage or outbuildings so they will open easily when ground to frost swollen



Shovel of snow settling on low-pitrhed or flat roof. Keep see from chapping the roof gutters



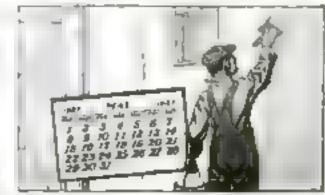
Give heating plant thorough once over, capecially getting efter woot. Add water to builer



Look over screens and acrers doors, thend botes, point frames and such, if not copper



Dig out the leaves from under the bridges, and carefully riess up all subbish on the grounds



Whitemanh the cellar. Put on accorns and account doors. Drain and clean heating plant

Mr. McMahon is at your service to help you solve your building problems, and will be glad to answer letters addressed to him in care of POPULAR SCIENCE MONTHLY. 250 Fourth avenue, New York City.

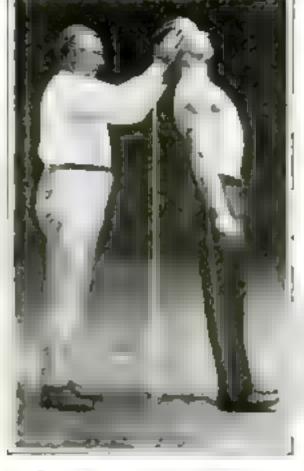
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HEALTHY, efficient body is the first need of every young man who intends to make a success of his

life. He needs it to enable him to do his

## Stand RIGHT

These Ten-Minute Exercises Will



2 Stand 5 to 18 inches from wall. Lean back on heels, without bending the back, until head touches wall. Repeat 10 to 20 times. In the picture Dr McCurdy's hands represent wall

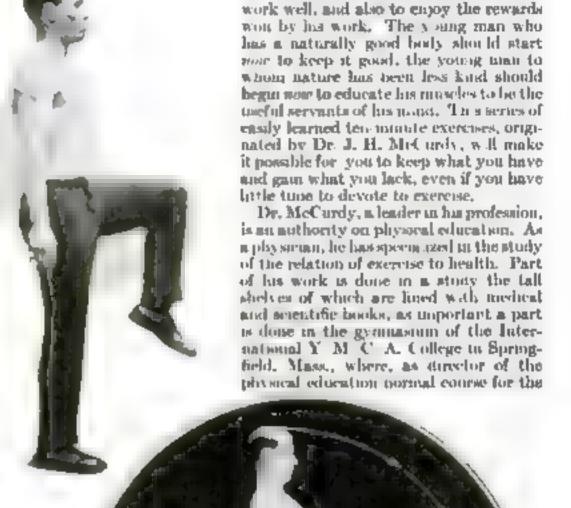
some 15 or 20 times

1 Stand as tall as possible, in position shows above, elbows well back and the abdomen drawn in. Press head against the constance of hands. Repeat 10 to 20 times

3 Standing on one spot, use running stode, with weight on balls of feet. Raise the knees as at right alternately 60 times, keeping body erect. This is "running in place"



4 Stand erect. Then bend to position above, palms turned to the rear, backs of the fingers touching the beek, and the arms pressed against the hips. Repeat 15 or 20 times





7 Lie on back with arms extended, and cause the body to a sitting position, at first using the elbows to assist in riang. In the picture, left, Dr. McCurdy is showing how the arms should be kept well back

## and Be Healthy!

## Make a New Man of You

preparation of teachers, he has for thirty years directed the training of young men who were studying to become "Y" physical directors. As Y M. C. A. athletic director for the A. E. F., he did valuable work in conditioning American soldiers for the game of war. Today his methods are being used in physical education work in all parts of the world.

AT THE age of 59, Dr McCordy plays a fast game of tenns and a quite able to hold his own with his pupils—all trained athletes—in strensous handball contests. He practices what he preaches, and attributes his excellent health and unusual physical ability to the fact that he has made a practice of enjoying every morning a series of exercises similar to these that he now so generously makes available to readers of Popular Science Montager

"A good bodily posture is more valuable than big muscles," mys Dr. Mc-Curdy, "Start your mornings by going through this series of simple postural exercises. They will tone up your body

for efficient daily work.



9 Stand 12 to 18 meters from doorway, with arms extended. Lean back on heels until arms rest against door frame as above, 5 to 15 times. Dr McCurdy's hands represent door

8 This exercise will help you to avoid accidents by developing a orase of balance and conscious control of your body. Stand as at left, breis raised, eyes closed, and walk forward, feet close together. 10 Stand erect, and raise arms first to shoulders, then over head as shown above, keeping arms well back. Repeat 15 to 20 times



an left foot, with right leg raised, as above, and hold position 5 seconds. Hop. Change to right foot with left leg raised, as indicated by dotted lines, and hold position 5 seconds. Hop. Return to original position. Repeat



12 Stand erect. Hop to left on the right Hold 5 seconds. Hop back on left foot, clicking heels together by swinging left leg to meet the right, so above. Repeat

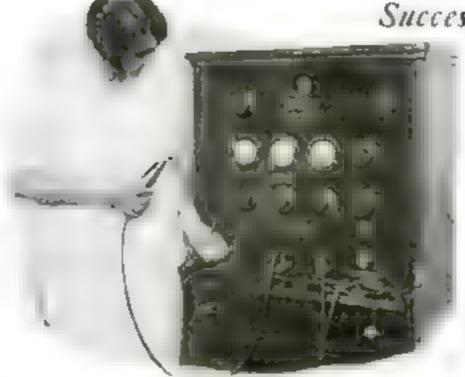
14 Lie on your back. Then raise the legs all terrately, keeping the kneep straight, as at left, and always keeping the lower leg at least a foot from the floor. Repeat this from 15 to 20 times.



13 Stand erect with eyes closed. Hop forward on right foot, grasping the left ankle with right hand behind the right knee, as above, and hold position is accords. Repeat, changing from left to right at will

## March of Progress in Science

Success Factors, New Serums, Clothes



Knife Cauterizes As It Cuts

For delicate operations, a new instrument called popularly a " radio ich fe has been pe fectra recently fits outling edge resembles a needle through which high frequency riectric currents are sest. These currents produce cold spacks that cauteriar the wound as the known cuts without injuring the tissues. In the above photograph are thown the "radio lende" so well so the electric control board.

On these pages are presented early month beself slaving of scientific discovery and research having practical bearing an our every-day problems.

## Old Ideas of Success Wrong

HAT are the factors that make a man a micross of a faisure? On this question, which perhaps interests us all more than any other, science of tate has been altering our opinions radically.

A long-prevalent idea has been that the only claid in a family suffers a sierided handleap as far as success is concerned. And so we have been accustomed to pity the pumpered youngster who grown up without the companionship of brothers and sisters. Now, however comes John C. Stuart, psychologist at Calgate University, to upset this notion. From laboratory tests be corclades that the only endd goes out into the world with us good at chance of success us a child with many brothers and sisters. This investigator, in his tests, examined 465 students representing families of different sizes. Eighty-one of them were "only childress." 134 were from families with two chadren, and five had mue brothers and sisters cach.

Another popular belief which seems now to be contradicted by psychological test in that a person who may be punfully alow in one line of endeavor may be unusually quick in another. Recent intelligence tests conducted at Harvard University indicate that the speed at which you think or act is as noich a part of your personality as your disposition.

Students were asked to solve puzzles, complete sentences, and do a wide variety of mental tasks as quickly as possible. The results revealed that the students who aboved the greatest speed on one test also excelled in most of the others,

and that the rating of each student was practically uniform throughout all the tests. Thus, the experimentaneoused to demonstrate that a person who is slow at one thing is also slow at everything, and vice versa.

## Don't Blame the Baker

IF YOU are temptof the bread and basents your wife makes, go slow. The temple may be not in the baking, but in the flour.

For one thing, the flour may be ground too fine. Two chemists of the

Food Research Institute at Stanford University, Dra. C. L. Visberg and E. P. Graffing, have just discovered that too much granding injures the starch in the grain. As a result, bread rises too fast at first, and then fulls.

Excessive granding also unness the glaten, which makes bread dough clasts, and then the dough is difficult to kneed.

### Noislest Place in the World

THERE is at least one place in the world that is even noiser than New York City's busiest street intersection, and that place is

Recent tests made with an audiometer. a new noise-measuring instrument perfected by the Bell Telephone Laboratories, showed that the tunish of the cutariot at the mouth of the Cave of the Winds would smother the

Nugera Falls.

### Dusting Off a Dizonaur

Preparatory to being removed to a agoly built wing, the great collection of uncient fossils of the American Minarum of Nat. arel History, New York City, recently was given a thorough cleming. The vacuum cleaner was found to be the prestest aid in this work. It took the dust off without scattering it on other exhibits. The pacture at the right shows the skeleton of a bage dinounce being channed

roar and clatter of trans and cars at the intersection of Sixth avenue, Broadway, and Thirty fourth street.

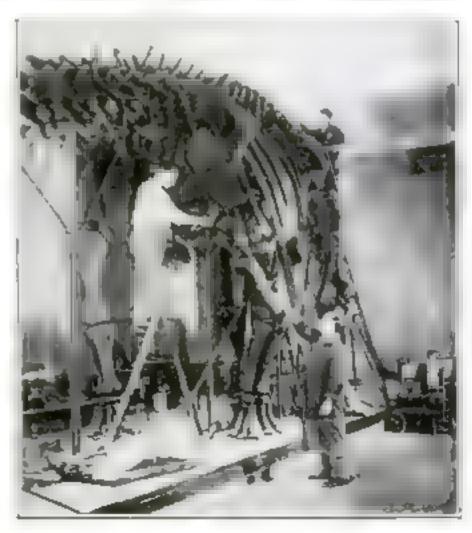
Nagara's noise measured seventy units, whose the best that busiest spot or the metropolis could do was fifty-five.

### New Victories over Disease

AGAIN the nucroscope and the test tabe have rendered valuant service in the war against man's great enemy docase. As this is written there comes the announcement from Detroit that Dr. N. S. Ferry, bacteriologist, and L. W. Fisher, chemist, have discovered the tiny organism which causes measles, and with it have succeeded in producing an effective measles autitoxin. Thus another contagions and often serious anneal, which has been reparted as almost in evitable in every household where there are children, soon will take its place with diphtheria and searlet fever on the last of preventable discovers.

To that list, also, even decaded taberculose may be added before long. For from Paris are reported remarkable successes by Professor Albert Calmetta with his recently perfected taberculosis vaccine. More than 8 000 babies been in tuberculosis infected households have been given this preventive treatment the vaccine being administered either through the mouth or by association. Of these, less than two percent have died of the disease—a striking reduction from the average mortality of twenty five percent for European children in tuberculoses bonnes.

Epilepsy, mother disease long held virtually acurable likewise seems doomed to surrender. Dr. L. W. Calids, direc-





for of the medical department of the Cleveland public schools, is experiment-

sug with a vuccine

Finally, two accentists of the University of Wisconsia, Dr. Paul E. Clark and Ance Shiedt Clark working with Dr. L. O. Dutton of the Methodist Hospital, Memphis, Terro, have unnounced the discovery of an invisible enemy which devours the deadly bacteria responsible for one of the worst types of blood pursuing and of one of the most severe types of priesmonia.

## **Bad Roads and Your Tires**

HOW much do poor roads add to the

An answer has just been given by Professor 5. S. Stenberg of the National Research Council's highway research board, through a series of tests in which an automobile was driven over different types of roads.

It was found that concrete or brack roads enused the least tire wear, the loss in weight of each tire being about one conce for a 500-in le rim. The wear caused by gravel roads was from two to seven times as great, while that on machadam was from ten to fifty times.

The results of the tests also proved that the wese on front tree is from fifty to seventy-five percent less than on rear

#### Monuments to Our Genius

If YOU have watched the construction of a modern steel skyscraper rising thatly or forty stories, no doubt you have wondered how long such a mammoth structure will last. Will it, like famous cathedrals and towers of the Old World, withstand the buffeting of centuries?

To these fascinating speculations, a partial answer recently was given by engineers who had charge of tearing down the world-famous Madison Square Garden in New York City. A careful survey of the condition of its icon and steel framework after some thirty five years of service showed that virtually all of it was in as perfect condition as on the day it was

erected, in spate of the fact that few precautions ever had been taken to protect and preserve it.

In its passing, the old Carden, scene of many notable events, at least has demonstrated that the great steel structures of the twentieth century are espable of more than temporary fame, and that centuries from new our tallest sky-scrapers may still be preserved as impressing monoments to the mechanical and engineering genos of our age.

#### The Choice of Summer Clothes

"WHAT shall I wear?" Most of us have been accustomed to answer this question accurding to individual whene and tastes or commonly accepted



A New Serum for Tetanus

The only known teturis materia has been produced recently by two Paris precises De Charles Ramon of the Pasteur Institute, left, and Dr. Christian Zoeller of the Val-de-Grace matery hospital right. They are also given credit for the document of a diphthesis anatoxin.

notions of what is cool in monner and warm in winter. New, however, exact knowledge to guide us in the choice of attire is forthcoming from the scientist's becometery.

In the clothing and textiles department of the Kansan State Agricultural Codege tests to determine which chains glabries shock the ikin best from the rays of the sam have shown that a right penetrates exiton and linen faster than either solk or wood in other words, that a right focus absorb more of the sun's rays than do regetable fibers. The tests proved that through them a good sunborn was produced by summer sen in one and one half homes, through cotton as two house through wood in seven hours, and through salk in ten hours.

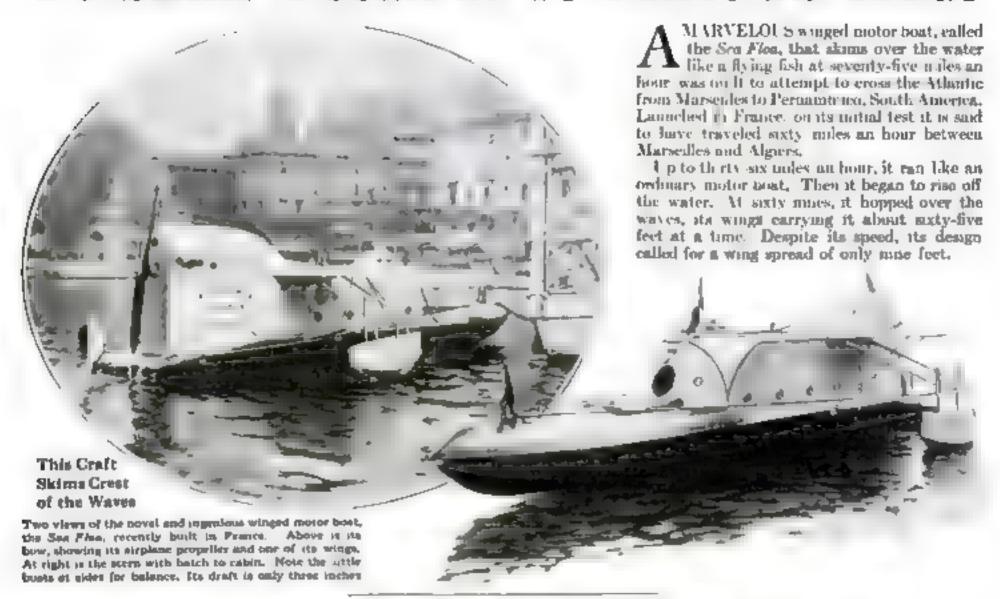
List how much altra-violet smalight is beneficial or harmful to our bodies, stol is an open question. But, meanwhile, those of us who are susceptime to and burn now can know what to wear when we sit out on the beach this auguner,

#### To Study Sun's Radiation.

ODDA enough, one of the most provides and the world soon will be the scene of one of the most exacting and for-reaching undertakings of modern science. In the wild plateau land of the Hottentots and the Bushmen are to be set up the most debrate instruments of astronomy in a remarkable attempt to establish a means of making accurate long-distance weather forecasts.

Dr. Charles G. Abbott, head of the solar radiation expedition of the National Geographic Society, recently announced that Brukkaros, in Southwest Africa, had been chosen as the ate for an observatory where the sun's rays will be measured every day for a period of four years. These measurements are expected to determine whether variations in the sun's radiation can be gaged accurately enough to predict weather changes far in advance Brukkaros was relected for the experiments because of its clear, cool climate.

## To Skim Ocean at 75 Miles an Hour



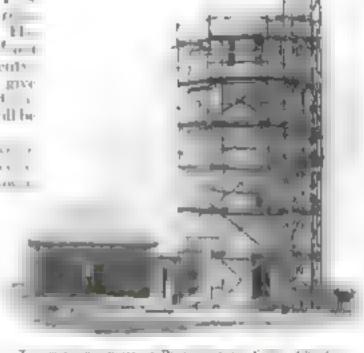
## The Finest Lighthouse Station in the World

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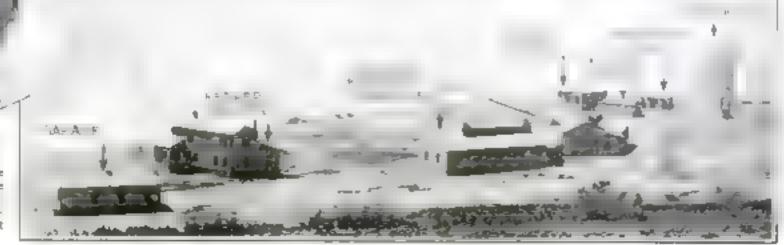


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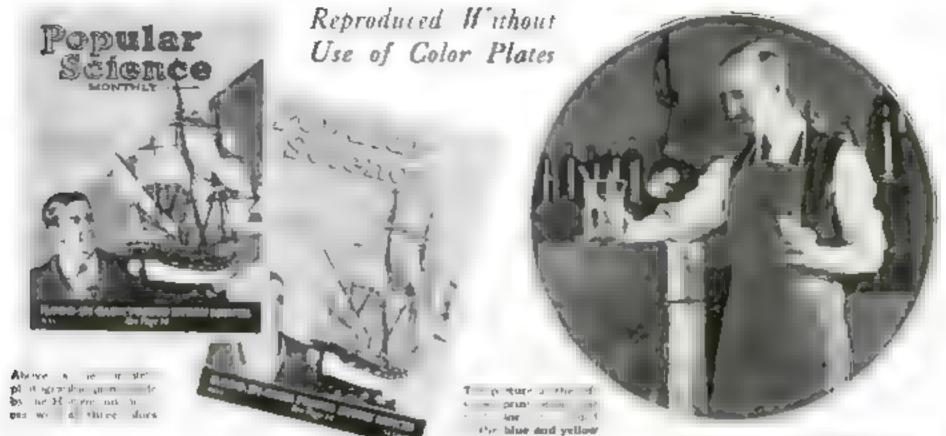


## In Charge of Light

The version keeper G W
L Hammonean, pend of the
work's finest agh house
station a Point Vicente
and the group of buildings belonging to the plant



## Photographic Prints in Full Colors



If A averebant wanted a few followood photographs of some merchandse so has salesmen would not have to carry samples when calling on customers, be would have up to a job getting them at a reasonable price. The printer could sopply lum only after spending hundreds of dodars for special color pastes to run off the prints desired.

The production of a few pictures in color on ordinary paper has been a problem that has long buffled scientists. The only way to get them has been by special color plates, using a different color of ink for each color in the object. Glass transparencies in full color have been known for some time, but they are not popular

because they are beavy, easily broken, and must be held up to the light in order to see the picture.

Now Lewis Holtzmann, of Jersey Cas, N.J., has found a way to reproduce the colors in any photographic subject on ordinary paper.

Photographers have long known how to separate colors so that if flerest negatives register the total amount of the primary colors. In fact, this process is widely used in preparing the plates for the colored lituatrations in magazines and advertising circulars.

Hottengana a process follows the same general lines until he has produced three negatives of the original one for each of Lewis Hottemann, of Jersey City, N. J., inventor of new method for reproducing photographs in colors, in his laboratory

the three primary colors. He then sendtizes a piece of paper and proceeds to print photographically with agit from one of the negatives. Then, taking the same print, he resens tizes it for another color which is printed on top of the first. The process is repeated for the third colors found in the original

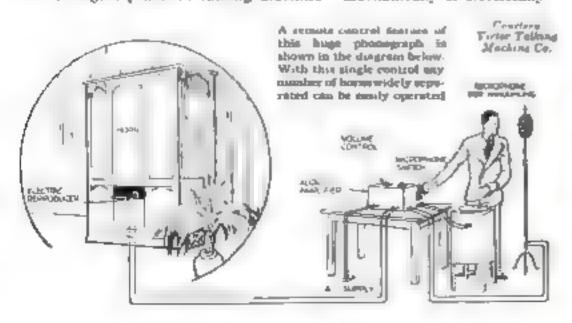
To demonstrate now perfectly be can make photographor points in full ristor. Holtzmann made one of the cover of the May number of Postava Screens Montair, which is shown above in full colors and before the red had been added.

## World's Largest Talking Machine

POR great auditoriums, churches, theaters, hote a and other places where a large volume of tone is desired, the manimoth taking machine at the right which plays an ordinary a zed record, has been recent a built. Its hoge horn, twenty feet long, is ingeneously fosted so that the whole instrument is built into a cabinet about eight feet wide, four feet deep and eleven feet high.

The largest practical talking muchine

ever hadt the new austrament can displicate both the volume and quanty of the mass of a pape organ a whole orchestra, or complete band. In a recent out-of-shoot test, the voice of an open star was heard clearly three blocks away, above the usual street noises. The austrament can be played either mechanically or electrically.









## A Bamboo Violin

The unusual instrument, above, is casted a bumbulan. It is made from a single solid piece of bumbub has strongs like a violen, and is played with a violen bow. Its enventer, Juan Y Belliumes, a parties of the Philippines, is shown with his mateument.

### Novel Use for a Beer Keg

We have had cannot muste for a long time. Now it comes in large. The fiddle shown above with its designer John Shreiner of Portland, Ore was made from a beer key and a few pieces of wood. It is said to farmsh just the right kind of music for the old-time denote



A radio learlepeaker have emplified the takes of this unities one string instrument above and makes it grand like a real violin. Violaphone is the name given it by its inventor, Joseph McConn. of Hew York City, who may be seen here playing on it

## A One-Man Jazz Band

Here's the latest and largest in harmonicas. It was made by Carmon Ungero of Memphis, Tenn., and contains several mouth organs, belle, and just devices. It is said to would like a whole just band when it is played. This unique homemade musical device is twenty seven largest long and six inches wide.

#### World's Oddest Band

At the right is the oddest joss band in the world, it a claimed. A Stamese bange, a Zulu territors and a genuse \$25,000 Strudivarios violin, played by amistants of the Carpegle Museum, Pitteburgh. The instruments were borrowed from the museum's collection, and are said to produce a fearfully wonderful type of jose moses rarely beants.

### Half-Brother to a Hawaiian Guitar

Jastitha is the same of this queer many little one string half brother to the Hawshan gustar. It is played with a pick and has just like a regular gustar. Music for at is written in numbers with data to indicate the time. Numbers on the flager board where the string is to be held by the barcurespond to the autsic. Its maker claims it is easy to learn to play.

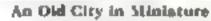


Models Make Real What Maps Fail to Tell



They Wish It Were Ready

These members of the Palamar Tennis C ub of Les Angeles above can tell cut how their new \$225,000 courts and crabbouse was soon book from the weeking model they are emporting



The model shows is a reproduction of St. Augustine, Fla., which gives a better idea of the old Spanish city than a map or picture could. This model is sarty fact long and about twenty-four feet under

NCE, when a person wanted to know what a city was like, he had to consult a flat map. Now he can see it pust as it is in a small model which is an exact replies in every particular. To get an idea of how a new hinding was going to look when completed you had to consult drawings, plans and blaceprints. These might help you, if you were good at visible and. But now you can be sure you can see it exactly as it will be in a little model perfect to the last detail.

All kinds of projects are shown today in these small mostels, which are growing more popular every day. Architects are using them to display their buildings, Sculptors employ them to present their sleas for statues and monuments. Real estate promoters find them useful in becoming their property. Some coter-prising hundrers are making small replicate of their bouses for prospective buyers.



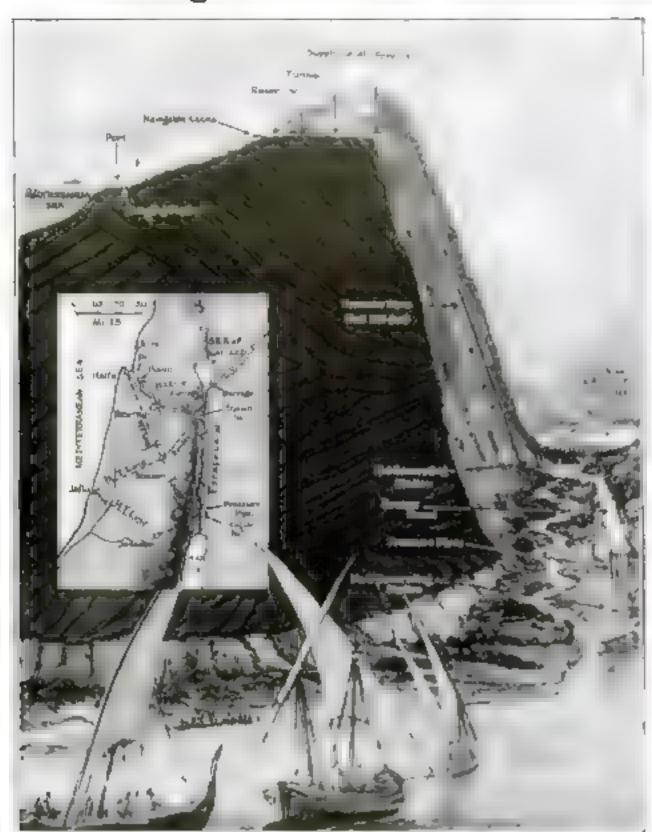
No Detail Is Neglected

A close up of one of the girls engaged in building the medel of \$4. August are Fig.. The alter of tron shows but parating a mile state subhouse.



How the Roosevelt Memorial Will Look

## Amazing Plan to Pour Mediterranean into Dead Sea



Tupping the Sen to Get Electricity for Palestine

Drawing shows how M. Imbenus, an engineer makes the Med terraneous supply power for the Holy Land by energing it into the Dead Sen. I heart diagram of proposed scheme

MUNTANA produces more high-grade manganese ore, used in the making of steel, than any other state in the Lamon.

## New Engine Hauls 125 Cara

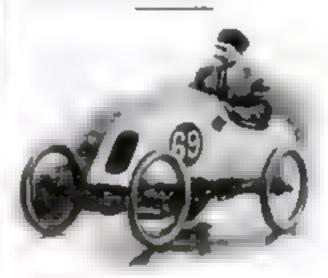
AN ENTIRELY new type of freight locumotive, having three extenders and expable of harding 125 cars across the Rocky mountains at the rate of fifty ander an boar was recently put in comprision by the Union Pacific Rudroad. It is the first to have three cylinders in combination, with six pairs of drive wheels. It is 102 feet long and weight 782,000 pounds. Its cost was \$105,000. It is exteen feet high, seven feet wide, carries 15,000 gallons of water, and consumes six tons of coal an hour

A NEW NUCL. and to be forty percent lighter and thirty percent cheaper than the present product, has been recently developed by the Swiss engineer, Hoshard, of Zurich. Experts who tested it at the Zurich Polytechnicum and at Dresden are said to have recommended it highly.

INGENIOUS plan to provide electric power for Palestine, devised by M. Imbeaux, a French engineer, is illustrated in the drawing at the left. By electrically operated pumps, M Imbeaux would bring the waters of the Mediterranean up to a reservoir to be built on the top of the ridge of highlands that separate the valley of the Jordan from the coast. From this reservoir the water would then he made to flow into a great basin just above the valley of the Nahr Djaloud, a tributary of the river Jordan. Thence it would fall a distance of 1115 feet to a hydroelectric generating station. Passing through that station, it would be carried in piper to a second station, and thence to the Dead Sea.

The surplus water in the Dead Sea would be taken care of, it is claused, by evaporation, which at present carries off duly as much water as the river Jordan points into it, nearly two billion gallons,

The plan also calls for the enlarging of the port of Hada, and a series of locks as shown in the diagram.



### World's Smallest Racing Car

AT RECENT automobile races on the Argenteral race truck in Paris, there appeared what is cianted to be the smallest racing car in the world, shown in the picture above. It is light but stordly built and has a powerful little engine. It just holds the driver

## Under-Water Sickle Clears Water of Weeds

TO KFEP rivers, likes and ponds cleared weeks that seriously interfers with boating, listing and hatbing in the sommer, and spoil the nee crop in winter.

C. L. Hockney of Silver Lake Was has invented the under-water weed cutter.

below. A sickle attached to a motor boat cuts a ten-foot swath in it is drawn along. Sode sickles prevent clogging or winding up of floating weeds.

One man can operate the machine, and can easily clear twenty acres a day



The under-water wand cutter and its inventor, C. L. Hockney

## Novel Restaurant Has Revolving Counter

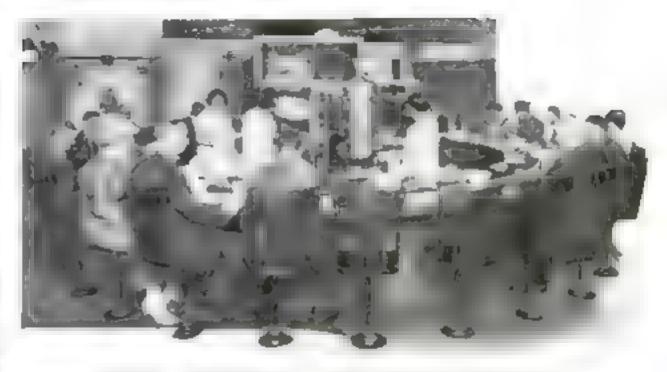
INSAN DIEGO, Calif. is a restaurant called the Banquet Cafe. Its window bears the invitation to come in and consume "Ail You Can Eat and Drink. Inside, the lunch counter is apparently ordinary in all respects except that it is circular. But you soon decover it is decatedly out of the ordinary. Around its inner edge is a revolving circle of wood which moves clockwise on rollers. The photo at the right snows at in operation.

serves you with butter, water a bowl of some and solverware. Thereafter you look out for yourself. Past you rolls an assortment of meats, vegetables, salads and descents. You kelp yourself to them. "Take as much as you can eat the proprietiess arges. "See! The moving circle runs through the kitchen. The rook will fill them up again.

## Better Welding Achieved by Two New Methods

A FTER years of research it is now possible to weld two metals together so that the fused metal is as strong and dietile as if it were never in two pieces. Two new processes that achieve this result were recently developed at the research approaches of the General Electric Company, one at Scheneciady, N. Y., and the other at West Lynn, Moss.

With previous methods abliting on electric arc to furnish the necessary heat, compounds of the metals with oxygen and introgen were formed, and the weld was not so strong as the rest of the piece thath the new processes are based on the exclusion of air from the metal during the welding, since the oxygen and narogen which unite with the metal come from the air. Thus is accomplished by a bath of hydrogen, water gas, who daleshol vapor, and other gases that do not easily form metallic compounds.



The interior of San Diego restaurant abouting unique resolving counter

## Detachable Spikes for Golf

FOR golfers, spikes that clamp on like skates, shown below, change any

shors into goshing shors. They can be used too, by hisers, hunters, or work men who need a firm grip on smooth or shapery surfaces.

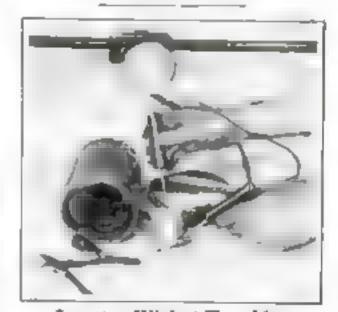
The pinter are adjustable to any size of shors. They are easily detached, a n draw be carried in the pocket.

Figure observer species of parasites have been imported from Europe to prey agon gypsy moths in an effort to check the ravages of those pests in New England.

### Nests Attract Bumblebees

READY-MADE nests for bumblebees, set up in various parts of the field, is a worth-while investment for clover raisers, according to a recent statement by Dr. Tocodore H. Frison of the illness State Natural History Survey If a house is waiting for her he says, a queen bre may move in and start a colony to the owner's profit.

It inhibites a substitute on clover blussome curry police away and that allow the seed free to develop. They are the farmer's best breed men, and be cut afford to provide them with homes. Or Fessia succeeded in getting tennits for half of the artificial nests that he set.



Locates Wiring Troubles

A COMPACT one-point detrouble shooter, which can be operated from any lamp socket may be seen above. It has been devised for home use, to help you find what is wrong with your radio, automobile, that most or any other electrical apparatus. It can be used to locate short, grounded or open rireuits, and to detect loose connections. With a rectifier, it can be used to charge B-batteries.

Shock-proof handles protect the user from shock, and the device is designed with a special socket that insures against fuse blow-outs. It is also best-proof,

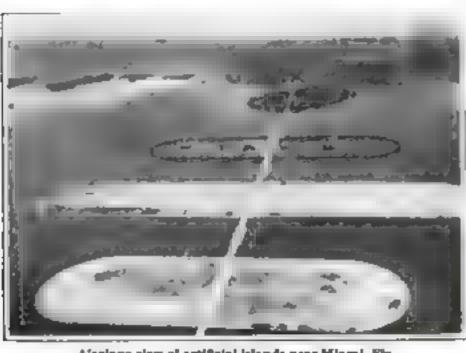
## Islands Made to Order on Florida Coast

THERE'S not enough of Florida to go around, so they re making more of it doily, taking it out of the sea. If

you have sufficient money you can order an island all your own, and in an amuzingly short time you can begin building

your house on it.

The executionally fine amplane photograph at the left shows three murvelous manufactured islands near Mumi. They were pumped out of the bottom of Bucayne Bay, Crossing them. is a new causeway to Mumi Beach. which is seen in the distance To make these islands, piles were driven in the water and then salt was piped in the euclosures. Any shape of asland desared can be made.



Airpiane view of artificial islands near bliami, Fig.

## Captain Builds Model of Ship He Sailed



Captain Williamon purries final touches to his ship model

LOYDON DOCTORS are passed by the experience of ex-Sergeant Frederick George Lee, one of the blood supply men of the Middlesex Hospital. In the last three years he has given blood to twenty-four patients. Seven of them have ded, and, although Lee had never seen any of them, at the exact moment of their deaths he is said to have felt severe pains in his arm and to have become sick.

## How Much Do YOU Know about Science?

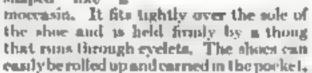
YOU may perhaps know a good deal about nature and her daily wonders. But do you know all that well-informed persons should? Here is a good test of your knowledge. Below we print twelve questions that deal with common, everyday, natural facts that everyone should know. Try to answer them from memory. Then then to page 127 and see how nearly correct your answers were.

- 1. Why can more notes be produced on a violin, which has only four strings, then on a piano, which has many?
- 2. How are the joints of the body lubricated?
  - 2. What causes the tides?
- 4. Why do seeds lie in the ground all winter and then uprout in apring?
- 5. What is meant by pasteurized milk?
- How does heat get to us from the sun?
  - 7. Why is yawning catching?
  - 3. What is liquid air used for?
- How is limentone produced by fiving creatures?
- 10. How can the weight of a large ship be determined without taking it out of the water?
- 11. Why is there light in daytime even when the pun is hidden?
- 12. How can desert travelers tell a mirage from a real lake?

THOSE were wooderful days not so many years ago, when great sailing vessels were nuccus of the seas. There was adventure and romance aplenty then. Captaut Fredenck Williamson of the Sailors' Snug Harbor, home for veteran seamen on Staten Ishand, N. Y., loves to recall them by building models of ships of those days. In the picture at the left, the captain is seen finishing a fine model of the forrenor Robert which he sailed forty years ago.

## A Non-Skid Shoe for Bowlers

URING a bowling mutch, the soles of the shoes often become slippery and slow up a player's game considerably, making him mose easy shots. To overcome that difficulty, a special overaboe for howlers has been devised by a Highland Park. Mich., lover of the game. It is made of soft leather and is shaped like a







## Grade Crossings of Old Rails Put an End to Bumps

THE old-fashioned plank crossing at the intersections of radromis and highways will soon give place, it is said, to a new type recently developed by a mid-west railroad. The new crossing, shown above, is constructed of discarded steel rails, placed closely together and embedded in a mixture of asphalt and crushed rock, after first being spiked to heavy timbers instead of the usual ties. The ends of the rails are bent downward a distance of about eighteen inches back from the end.

The new crossings are smooth, and the upkeep is said to be much less than for plank crossings, which work loose and become broupy after a few mouths' use. The designers claim they will wear for years and will not loosen, as they rise and fall with the rails used by the trains.

## To liave an Indian Village

AN INDIAN garden and village are soon to be erected at the Broam. New York City, as part of the Museum of the American Indian. The first wing to be half will contain a museum of Indian relact. When the whole building is completed, the open patro in the center will be occupied by a botanical garden of paints used by North American Indians as food and as medicine. Foll-size models of Indian dwellings will also be constructed to give a good size of Indian home afe.

## Huge Eclipse Camera Protected by Thatch

TO BE ready for the total eclipse of the son that occurred early this year, groups of scientists from all over the wort spent months of prep-

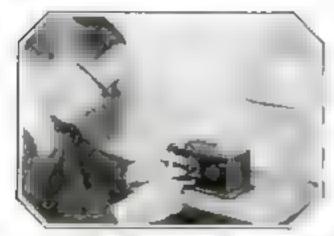
aration in Sumatra Much of this time waspent in setting up and building shelters for their delicate instruments from the glaring sun and torrential ruun of the tropics. The photograph shows how the Swarthmore College expedition protected its giant 63-foot camera that played an important part in making pictorial records of all stages of the eclipse.

The covering of

the tower, the telescope take and the dock many was made of a thatch of "ntop," which is considered the best protection is a sum and small the agreement the high terminal the soundaring an ecupse.

The giant 63-foot camers of the Swarthmore College eclipse expedition is Sometre, covered with theuch to protect at from son and rain

## Goat Leads Sheep to Their Slaughter



## Cigarette Humidor Looks Like Small Radio Cabinet

TUNE-IN and get a cigarette. Turning the dial to either the right or left in this novel hunnder, which is built to resemble a radio cabinet, brings a cigarette tumbling forth. It is large enough to hold 100 cigarettes.

The interior of this radio eigarette box is divided into two compartments. The one to the right holds the eigarettes, while the one at the left contains the mechanism connected with the disling system.

## A New Oil from Grape Seeds

FRENCH scientists have discovered a new use for grape seeds. They are extracting a lishricating oil from them. As soon as the grapes have been pressed, the seeds are removed from the skins and dried. They are then subjected to a process for removing their oil.

A thousand kilograms of grape hinks give about 230 kilograms of seeds, from which about twenty-seven kilograms of oil are obtained. The residue is used for fertilizer.

With this new oil, French engancers hope to replace cautor oil, which it resembles, as a lubricant for delicate motors, raproially of airplanes. Castoe oil is expensive, being imported from India, while the new oil is comparatively cheap and equally efficient. Already factories have been established in many wine districts of France with a capacity for handling thousands of terms year and a new industry is developing.



Judge leading sheep to killing petts of elaughterhouse

## Puts Out Fire without Liquid

to the killing pens

of a Los Angeles

packing plant,

SHUTTING off the air will stop a fire at once, and any apparatus deargued to do this is vitally important

In a new design of fire extinguisher, shown at the left, there is no liquid. A combination of powder and earbonic gas is used instead.

When the cone-shaped powder holder is turned upside down and a valve on the gas cylinder turned a blanket is formed over the fire. This cuts off the oxygen supply and prevents further combustion. It develops no funes to hamper the person using it, and is said to put out all types of fires. When not in use the extinguisher is held in a bracket on the walt in some easily accessible place.

## RAIN GOING up instead of down in the interesting spectacle witnessed by a man in a captive balloon in the midst of a somemer thunderstorm.

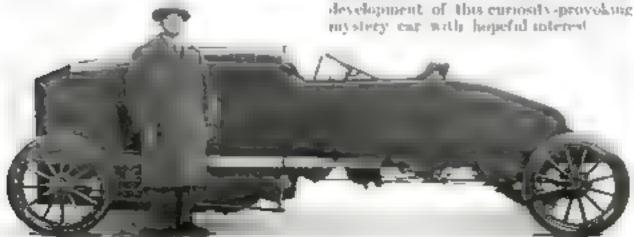
## Chinese Have New Typewriter

A TYPEWRITER that is said to be capable of transcribing 5,000 Chinese ideographic again, designed by a native of Sluanghai, has been recently put on the market in China. It is claimed that with two months' practice an educated Chinaman can acquire a speed of 2,000 characters as hour. The citice apparatus weighs about forty pounds.

## This Mystery Automobile Runs on Air

THIS inventor has the right idea. Lee Barton Williams, of Pittsburgh. Pa., has invented an automobile which he claims, runs on air. The motor starts on gasoline but after it has reached a speed of ten mides an hour the gasoline supply is shut off and the air starts to work.

In its first test, made recently in Pittsburgh, the strange vehicle attained a speed of sixty two miles an hour. The inventor for the present refuses to explain how air makes the wheels go round. Thousands of automobile owners who are paying out considerable sums every week for motor fuel will watch the further development of this curiosity-provoking



Lee Barton Williams, Pittsburgh inventor, and his automobile that he claims runs on air, after it gets up a speed of ten make an bour. It recently attained 62 miles as how

## KNOW YOUR CAR

ACTOMOBILE engineers say that the inspirity of cars that fail to give efficient service have been runsed by careless driving in the first thousand miles. Like a new pair of shoes, a new car must be "broken in," otherwise trouble is almost certain to develop.

A new car is "stiff—the various moving parts have not yet accommodated themselves to one another, and the car will not function perfectly until after there has been a certain amount of wear between these parts.

Too fast driving when the car is new will cause, among other things, excessive wear between these parts, and the harm is likely to be irreparable.

To break in your new car

- 1. For the first thousand miles, drive at a speed of twenty-five miles an bour, or less.
- Take full advantage of the service offered by your dealer, or, if no service is offered, have your car inspected periodically during the first thousand miles by a competent mechanic.
- Make oure that the car is kept thoroughly greased and olied, and stop and investigate at once if the motor appears to be overheating or if any peculiar noises are heard.

# Pages from the



## Fire Day in the School

None of the children miss school the day Harry K. Rogers and his forcesting model of a real fire engine, right, are acheduled to appear. He shows them how to prevent fires and what to do when one is discovered. All over the country this safety engineer is lecturing to children in a comparing to reduce the tremendous daily fire less preserving in the United States.

## Thirteen to a Hand

Holding thereen brants balls flat in one hand is a record George Agutter, above, a professional tennia player cluster gives him one world championality. Another he to take, belongs to him for holding nine bells in one hand while serving a ball with the other hand.

### The World in Canes

On a recent velo around the world Em i C. Kinche of Mannenpes a. Minn., bought a cane every place he stooped. The result is the coure tion above at the right it remarks of all kinds and shapes, from set six minds creations to reade, twisted from the judgle obtained from the judgle





### Folling the Smoke Clouds

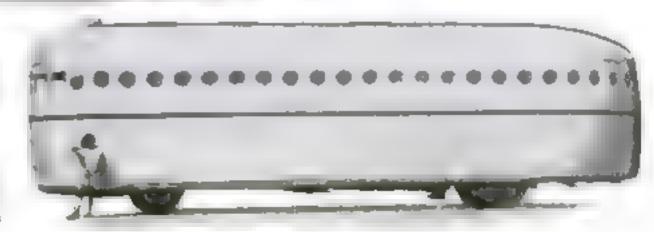
To ceach the Chicago weather bureau tower, Edward Lawier assistant weather forecaster, above has to wear this leather suit and gas mark as a protection from amoke and soot. The tower is directly above a buge smokestack

### The Stamese Twins of Flivvers

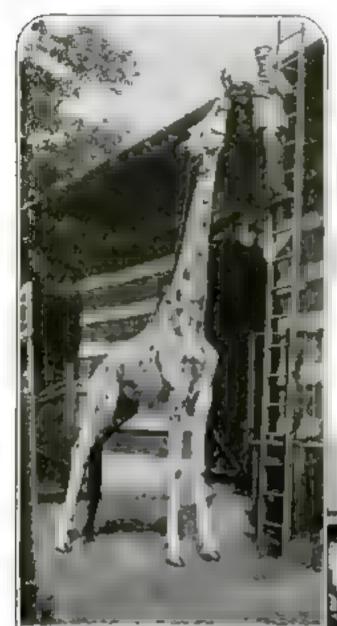
By looking quickly at this double-headed flavour you can't tell which is the front or the back. They both look alike. With two drivers and two men ready to crunk it, the effect to myst fring. This pursies has been used recently for advertising purposes by a Somerville, Mann, company

## An Eight-Room Fiat-on Wheels

The ray at the right looks like the cabin of a huge dragble but in reality it a a motor flat of eight points with kitchemette and both. It was built by Charles Louvel, a French exceptor and him pust secondly appeared on the streets of Mice, France

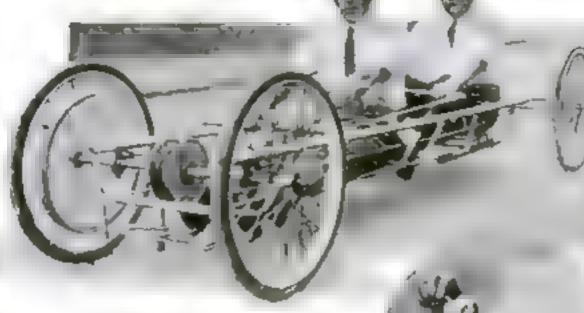


## World's Scrapbook



### Measuring a Gimffe

Here a how they menaire graffes at he Zimbig of the New York. A keeper on a unider halo a out food. As the guadle reaches for to height is more used by the mode range, which are one thy one nost open. This puells is beyonder fort from 2005 to tongue tip.



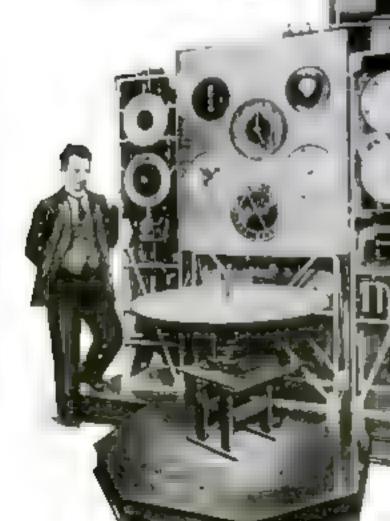
### Rowling through the Streets

Above of a move land short invented by Dr. Core, a cipe of a softens in M. o. b. Stermany. A cooking the result of their united and softens in the state of their united and a speed of a govern one-re an in the properties of a speed of a govern one-re an in the



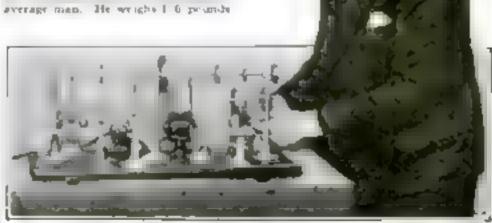
### His Claim to Fame

The hamping speckets care is the total Man. Mostague of Lan Aug. in the man. He become a resident about a military at the times a day. Above in just a mouthful



## Bigger Than a Man

The Great Date to and above had the the new man of he ag the long at of 1 1 1 dogs at a set of each to a man of the ag. On a feare he are a see a few her the see of r. On his had been be a talke town on average man. He wright I is promite



### Clock Has 468 Wheels

This interconnects clock left tells everything but your age. It has the see dials for the time age a carrier good for 15 600 years. This everything has eighteen unit works insuring 468 wheels. Its designer Oswald S. haliz of Bertin, stands beade it.

### A Tiny Machine Shop

the Mathematic receiving sub-born as the National Toy Fair of New York City was his on said to be the employed working math or shop of the world. It is that by electricity

## Novel Car Brings Birds Food and Shelter



Stocking bird-feeding our at window without leaving house

O FEED the birds from the house, the little cur. left, which works back and forth on a cable, has been designed. Stocked with food at the window, it runs to the other end of the line, under the trees, where the birds gather. It is drawn back by a rope. It contains a druking cup. wire feeding rack, food Insper and suct book, It has also a roof to shelter its guests. The lattle car as a boson for thelumismbadweather

## Convertible Saw Frame Has Pistol Grip Handle

A UNUSUAL, recently designed saw frame that has a pistol handle grip and can be used with many ages of handes, is said to save time on jobs where it is hard to get at the work. A gap between the blade and the handle enables the user to reach around obstructions with it, and to saw in close quarters wherever a two nich stroke can be made.

Blades from three to twelve a ches can be used in this noncollapsible, convertible feame. Carpenters and electricians, the designer claims, will find it meful in sawing on the other side of posts, and mechanics for reaching behind pipes, and others to do aways and sawing jobs.

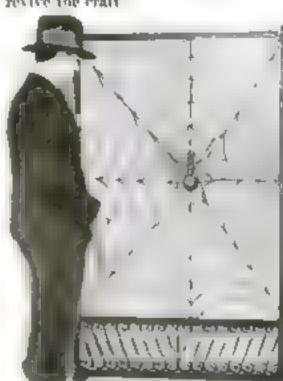
## Navy Develops New Engine

A TWO-CYLINDER arresult engine A comploying heavy oil has been developed by the Navy Department and it proves as successful as lests seem to promise, a more powerful engine of the same type will be constructed. The new engine, invented by A.P. Attenda is said to be of special value for daughter he cause its fiel is nearly normal amount of the seems of the powerful powerful promise and the seems of the promise per high.

## A Spider's Web Iron Gate

SO BEATTIFUL are most of nature's designs that our craftsmen can do no better than to copy them. Nothing one could magnic for himself cound he more wonderful, for instance, than the introduce spider's web. The illustration below shows how thus has been used for the delicate design of a hand-wrought ron door.

This was one of the most striking pieces at an exhibition recently held in London Until the fourteenth century. England was famed for its bond wrought from work and efforts are being made today to revive the craft.



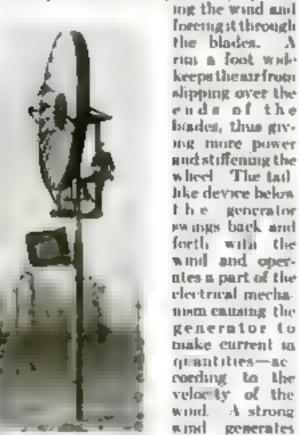
Hand-wrought iron gate with spider web design recently shown in London

## Ingenious Windmill Supplies Farm with Electricity

ELECTRICITY taken from the air supplies a farm in Anderson, Ind., with light and power practically without rost. During the dall winter months, C.E. Miller and W.T. Moser, with the aid of an electrician, William Maze, made the machine illustrated below, which the inventors claim is entirely automatic and generates electricity any time that there is a fair breeze.

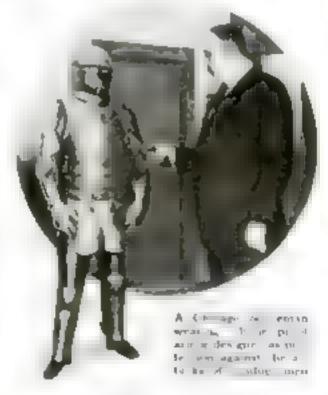
Twenty-four propeller blades are langed to one aide and are held in proper position with a broad coil apring which is adjusted to yield under excessive wind. This governs the speed of the wheel and makes it age to weather storms.

A cone point heads into the wind and atilizes power, ordinarily lost, by spread-



full capacity of the generator.

A specially built belt, made from automobile fauric and covered with rubber transmits power to the generator. The electricity generated in stored in a large battery which will carry a sufficient quantity for light and other purposes for a period of about two weeks should there be no breeze in that time. The machine operates as quietly as an electric fan



## Armor to Protect Policemen from Bandits' Attacks

CHICAGO policemen may soon look the like kinghts of old, if the braits of the department decide to adopt the metal armor shown above, which has been under consideration for some time. It was manufactured by a Baston firm and was designed to protect the police from the attacks of the modern holdup man becoming to its manufacturers the armor is absolutely buffet-proof, and will withstand the worst gun fire. It makes and to be neither very heavy nor cumbersome, and does not interfere with the wearer's movements. The belinet has an adjustable visor which can be russed.

## Urges Tattooing of Pigs

IN ORDER that pigs may be readily identified after shoughter, and disputes as to ownership avoided in cooperative marketing, the United States Department of Agriculture orges farmers to tattoo their pigs.

A new method of tattoonig, and to be inexpensive, employs a metal holder in which phonograph needles are imbedded to form initials or numbers. The needles are dipped in black automobile enamel, and the mark is put on by striking the pig across the back with them.



## Novel Type of Toothbrush Has Detachable Handie

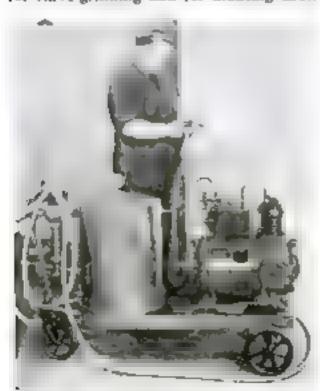
A COVEL idea in toothbrishes is illustrated above. It consists of a metal holder to which are fitted small brushes that can be removed when worn out and replaced with new ones. The brushes are tightly locked into the holder with a key, and cannot loosen or fall out. They are said to be made of a good quality of bristles, and a number of refills are supplied with each handle. A metal cover ships over the brush when it is not in use, and keeps the dust out. The new brush is claimed to outlast the organizer toothbrish that is now in general use.

A TELESCOPE-CAMERA has been devised recently by Professor Chaton H. Currier of Brown University to photograph meteors. This camera is operated by clockwork, and the instrument covers sixty-four square degrees of the neavens.

## Painting May Be Done Quickly with Portable Sprayer

CLEANING and brightening up the shop with paint may be done quickly with the portable blower and sprayer which is shown below. It consists of a heavy duty compressor run by electricity, a fifteen gallon tank, a spray gon and twenty five feet of hose mounted on a steel track.

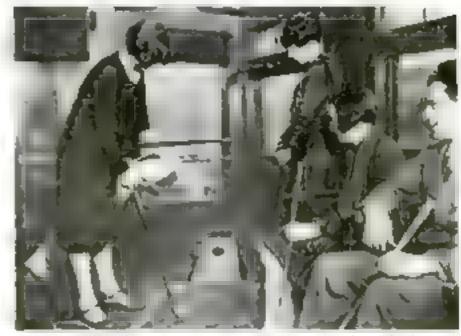
This portable machine can be used for printing automobiles, walls, furniture or machinery. It may also be employed for cleaning printing presses and other machinery and for blowing dest and symps out of places that are afficult to read with a broom or brosh. In garages it can be used for cleaning engines, upholatery, for valve granding and for inflating tires.



Giving the factory wall a cost of point with a new and convenient type of portable sprayer

## A Golf School on Wheels for Tourists

R MN or shine fans on a trop by tram to the South recently had their daily practice, under professional conchang. A putting correct was had out in a teature car and a love and t held, as seen a me picture at the resident Driving nels were set up in a bag are or The Train Lep Tourists" was the name given form selves by the 100 cm thusiasts who made up the party



Learning fine points of tame in first got school on whenle



## **Brush and Mirror Combination**

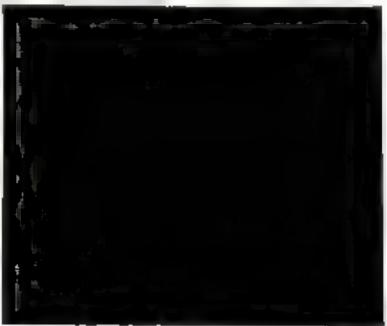
A BRUSH to keep the hair neat a mirror to see whether the part is straight, both contained in one compact case, comprise a late movelty that many persons have found useful. It is small emorgh to stip in the pocket ready for instant use.

The introvers on the under side of the lid. Pressure on the case removes the brush so that both mirror and brush can be used at the same time. The case is of aluminum, and the brush has stiff black bristles set in rubber

## New Dye for Photographing Infra-Red Rays

A NEW dye called necessaria, which may prove extremely valuable to astronomers in photographing the lather-to-avisible infra-red rays has been developed recently by a great American photographic concern. The ordeners photographic paste is sensitive only to blue bight and the shorter my subte ultrasymetrans. It can however be sensitized to other colors by the use of dyes. The new dye makes them sensitive to light waves of 122 000 of an inch while the longest rays visible to the naked eye are 1 30,000 of an inch.

Plates treated with the new dye may prove a great aid to spectroscopy for the spectroscope shows light and dark lines in the invisible infra-red region of stars, which bitherto the astronomer was usable to distinguish clearly.



Hot Air Towels for Drying Your Face and Hands

J ST as the densking const have given way to modern auntary densking foon-

farms, 30, 15 18 confidently prericted, the paper or cloth towel is destanted to be thrown in the discard by the n e w bischine, alsown at the right, that dries the face and hands quickly by electrically heatorl air. Pressing a button furns on the current, and the hot air pours out through a norale.

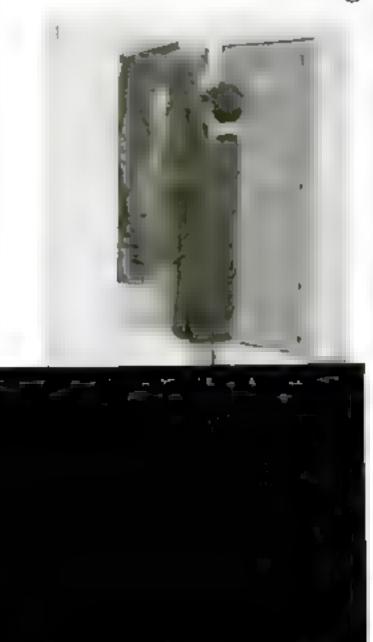
This new way is said to be absolutely sanitary. There is no dail ger of infection as with towels, and it prevents chapping and



leaves the skin smooth. Besides doing away with the waste and nuisance of towels, and the muss and untidiness of wash rooms, its use is far more economical than cloth or paper towels. The cost of upkeep is said to be three quarters less.

The new machine is being installed in many factories, clubs, hotels and stores.

## Steel Closets Designed for Apartments



of 14% cubic teches.

The discovery of this large skull in a present-day native is claused by some anthropologists to strengthen the theory that Africa was the tracke of the entire boson race.

## Roller Brush Restores Surface of Cloth

THE rolledike brush, shown below, said to be very effective in restoring the surface of fir, imitation fur, velvet

A coller brush for face

and other falreshaving a high
pile, was recently
invented by Elmer Hiatt. of
Miford. Conn.
The brush, which
resembles nomewhat the relier of
a carpet sweeper
is mounted on a
b a r with two
metal arms to
which is attached
a suitable had

the. Its bristles are stiff, and are set in such fashion that in going over the labric they raise the map that has been flattened down by wear. It is said to take the curis and kinks out of fur and mutation for and to give them the appearance of new goods.

The roder brush will remove the shine from worn gariner ts. it is claimed, by en sing the nap. It can also be used for ordinary clothes brushing, removing dust and dirt more quickly and more thoroughly than the usual brush. THE use of metal equipment in the home is increasing all the time. Kitchen cabinets, tables, chairs, washing machines, and tropers have been in use for some time. Cupbounds, too, of metal have been introduced with success. Beds of from and steel are common Dressers and other furniture are also being made of steel.

The latest steel product for the home is a clothes wall. It comes in various sites, ranging from the ordinary closet size for the small apartment to vanits big enough to hold large outlits of fors and other fabrics. Bhatrated at the left is one type designed for the small apartment. It fits into a recens just as the regular closet does, and is supplied ready to set in place thish with the plastered walls. The door is stained to match the wooden trim of the rest of the room.

The cost of installation is said to be moderate. These new clothes yields are claimed to be absolutely moth proof, and also to protect their contests from dost and dampness. They are being installed in many newly constructed apartments, and are said to be popular features.

## A Bow with a Sight

A SIGHT is part of every gun and insucces are nearly. But a how generally has no sight. Now Ed Everson, an archery



expert, of Los Angeles. Calif., has made a few modern improvements on the amient weapon to improve its aim.

He is shown above with a bow that he has equipped with a sight and claims that addition helps him to shoot straight

claimed that a person can do

fifty percent more work in a

given time with this new device than by the ordinary method.



## Combination Axe Made of One Piece of Steel

With head and handle of steel, the handy new axe, illustrated above, is, by its very construction, unbreakable. The handle cannot work loose and come out, so there is no danger of the head's flying off. A hand-hold of leather gives a firm grip, and the hand does not come in touch with the cold steel. This steel axe is said to be bighter in weight than the usuas wooden barrifed ones.

I wo immental feat rest of the sturdy are a book on the head that is useful for drawing out staples, as shown in the picture, and a claw at the end of the handle for pulling nails. Its head, of course, cas be used for harmnering. For employ and odd jobs around the house, that are is particularly metal. It is a handy tool to carry on an automobile at any time.

## Chromium Used in New Plating Process

AFTER long research, chromium, the hardest metal known, has been made by a new process available for plating. Chromium plating had been known for a long turn to be possible, but until now it was not considered commercially practicable. The new process was docovered by H. E. Haroog of the United States Burgan of Standards.

Chroneum is now being employed in making electrolytic plates for the faces of our dollar bills. By applying a thin layer, only 1 5,000 of an inch thick, of chromnm to these plates, their life is mercused over these that of case-hardened steel plates, and several times that of nickelfaced electrolytic plates without the application of chromium.

Broom on Wheels Speeds Sweeping DEVICE that, it is claimed, enables Four fant A a child to operate a four-foot broom brosm with rabber tired usually requiring a alterng man's efforts, wheels for easy. has been perfected by a San Francisco raped and clean work on floors man. The broom is mounted on two ruleher tired wheels the height of the broom. Pushing down the handle throws the broom on the wheels and lifts it two or three inches off the floor. Lifting the handle sets the broom down on the floor ready to sweep. The broom is moved easily from one spot to sunther without lifting it off the floor, and the sweeper can operate it a great deal faster and with much less effort than an It 15 ordinary broom.



Pocket Wedge Locks Door As Securely As Key

THE traveler who is included to be nervous and is not satisfied with the protection of the ordinary door lock in a hotel room may find the little wedge device illustrated above a very meful action atton. It is small enough to be carried in the pocket, but is said to be efficient in keeping intruders out of any room.

The wedge slips under the door from the maide and holds the door so tightly it cannot be opened from the outside. Spikes keep the device from slipping. The central part of the wedge is attached to a cord, and can be pulled out quality by the occupant of the room without his getting out of hed.

## Submarine Motion Pictures to Reveal Sea Secrets

THE secrets of the ocean floor will soon be revealed by motion pictures, according to Dr. Paul Bartach of the Canted States National Museum, Washington. who recently made an under-water camers hunt for fishes among the coral grottoes off the coast of Florida.

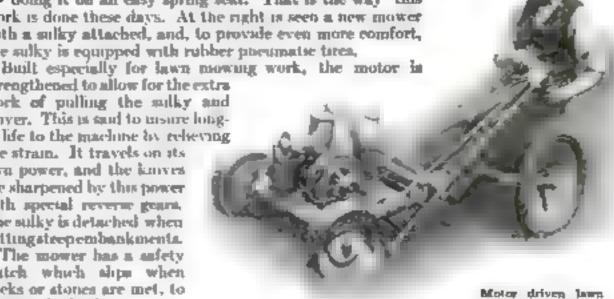
With a specially constructed waterproof machine, he secured hundreds of feet of pictures of submarine life, and spent as much as five and a half bours at a time walking about on the sea bottom at a depth of twenty feet below the surface. At this comparatively shallow depth, he says, life is varied and abundant, because corals and other small sea denizeus remain in the midst of the breakers where the flow of the tide waters beings them constant fresh supplies of microscopic plants and animals for their food. The camera man in these regions has little to fear from larger fish, he declares.

## Lawn Mower Has Sulky for Operator CEVEN acres of lawn mowed in a day, and riding while doing it on an easy spring seal. That is the way this work is done these days. At the right is seen a new mower with a sulky attached, and, to provide even more comfort, the sulky is equipped with rubber pneumatic tirea,

strengthened to allow for the extra work of pulling the sulky and driver. This is said to insure long-

er life to the muchine by relieving the strain. It travels on its own power, and the knives are sharpened by this power with special reverse genra-The sulky is detached when cuttingsteepembankments.

The mower has a safety clutch which slips when sticks or atones are met, to protect the knife



movee with sulley for see by the operator

## A Self-Cleaning Punch

"HIS new punch, below, it is claimed, A never gets clogged. Fastened to a heavy spring made the hollow panch is a plunger extending beyond the punch.

When the tool is lifted after a hole is driven, the spring ejects the cutting from the punch, and it is then clean for further use. The illustration below shows how this new punch is operated.



Categories page to and its imagins the ing spring shown in open section

#### army tractors for light artillery and to develop heavy trucks for nulriary and com-

A New Steel for Small Houses L16-HT structural steel which can be A used for small houses in much the same number in which heavier beams are employed in akynerapers has been per-

THE EVOLUM GOVERNMENT is making ex-

periments to end the use of horses in war.

A mechanical research camp was recently

established near Aldershot to improve

mercial transportation to replace horses.

feeted recently by a Pittsburgh manufacturer. The new steel, while light he weight, has greater proportional strength than any other steel so far produced. Hitherto lightweight atcel was impossible because there was no known way of rolling it, but after many years the necessary rolling process has now been perfected. The new steel can be used for floors and

## Little Metal Mold Makes Neat Golf Tees

roofs as well as for beauty.

QUICK and easy way to make a golf A tee is provided by a little metal mold recently invented. Instead of trying to scrape up a tee with your hands, or looking around for a convenient saled, tute, or

uming an artificual fee that you have to chase as well as the ball, all you have to do. it is claimed. в жоор ор зовре wel sand in the almotistic city. destrated at the ngnt, pack it iii tight by pressing against the side of the mind box trush on the top. and out comes



Making a golf rec

the tee, as next and firmly rounded as you could wish. It is not necessary to touch the sand with the hand

The cup is of simple construction and does not get out of order. It is very light and can be carried in your pocket. It helps your game, too, it is said, by giving just the right knod of a tee for a good drive. It speeds up the game, too, fans say.

## Motor Boats Displace Gondolas in Venice



Taxi hosts on the Grand Canal, Venice, are displacing the goodolss. A couple of the famous old goodoles may be seen further up the canal

THE picturesque gondola of Vensee is supply giving place to the more promise and speedier motor boat. It is doubtful whether the gondola will ever disappear entirely from the Venetian canals. For leasurely gluling along the Grand Canal and upthe sale canals, the goodola will always hold its own. But for rapid transit the motor taxi will displace it. In the picture at the left is seen the type of motor boats that are now popular in Venice.

## Eighteen Useful

A Self-Basting Pressure Cooker;

### Handle Will Not Char

A 2 B B PROBLEM

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Drams or Fills Tubs

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### A Self-Basting Cooker

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### To Protect Your Stores

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### Deodorant for Ice Box

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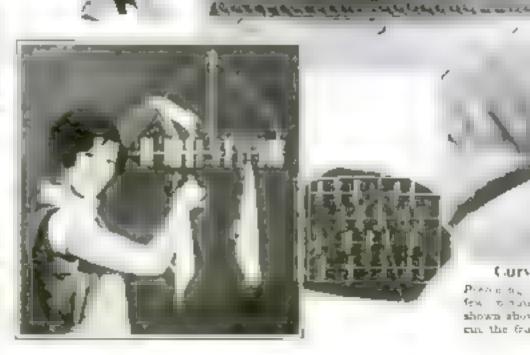
## A Help for Frying

For long factoring was found to be for an inches to the formation of the following form as a formation of the following to banks to be followed to the following to banks to be formation.



## Prevents Breaking Loaf of Cake

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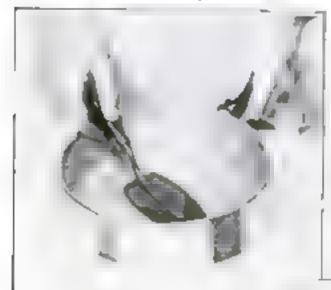


Curved knife for Grapefruit

Previous, he nor ki see not in takes but a few in naces with a misen gapefruit lende shown above. Both edges have sud-geth lint can the Gaze from he skin quickly and gent of

## Household Aids

Other Helps for the Homemaker



#### A Plinble Scraper

The acroper of the left in medt of metal, and is so corved on all nides that it his is all corners of the ples, no marrier what the shape. The metal is thin and platte and bends entity so that it will not scratch aturniques. It conalso be used for turning meats, rego or vegetables while they are conking

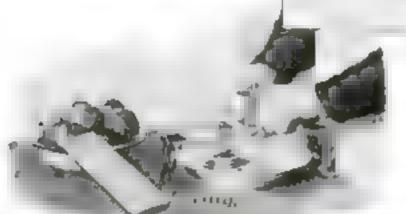


#### A Grater and Shredder

Very convenient is said to be the combinktion grater and sheedder which comes with a stand that can be placed Over a shallow benef as seen below. It can be used for slicing putatoes for frying by the use of a special attachment. which is useful also for other regetables

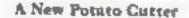


A small table that fits mugly into one corner. of the latches no one would over suspect t be merely covering the compact scores shows above. When the ranger a cot in use of its mechanism to completely covered by e top that changes it isto a very handy hitchen table. Illustration shows it at work



#### tongs for lifting

Kit ben tongs in theer. d foregation is ale ve make a han ly en in feir bin en rennt to hed a the ce to the man of a law by STATEGIE .. present of means the large war for balend gentlet see or best id about



Cutting potatoes for Prench frying is ordinarily a sengththe currer above in the picture at the left, with one stroke a whole poteto is cut in neet and even stripe for French friring. This cutter is made of metal, honeycombed in squares



Curtotas around showers. have a diagreeable hebit of sticking and refusing his budge when you try to move them. The roller bearing rings for shower curtains illustrated at the right are said to obviste this difficulty. A alight pull makes them glide along the pole assorthly and early





Pie Crust Crimper and Vent Curter

Ornadouther used to crompthe edges of her para with a fork and cut stram vents with a leafe. You can do both more quickly with the little tool above. that crimps the edge and ruts of corples crust st the same time. It has projections for making air vents



### New Type of Kettle Averta Scalding While Filling.

To elitabate the danger of scalding while removing the lid or filling a tenbettle containing boiling water a novel britic, above at the left, with an opening in front of the tested fid and the bundle, or being manufectured. This opening has a special cap to prevent the steam from encoping and cathing injury

## An Adjustable Tonater for an Open Fire

Toust can be made at the fire place webout burning one a angers by using the new jointed toesting fork on a ped cotel that may be seen at the left It can be set in any position desired, and does not have to be held with the hands

## Helps for Radio Beginners

## You Can Lengthen the Life of Your Tubes

Where to Put the Batteries

OOD vaccount tubes are absolutely necessary to get worth-while radio reception. You can change the ercurt, use different code or condensers, or entirely rebuild the set and still bring in the broadcast music or speech; but no matter how you shift things around, your results still depend entirely on the war-

Consequently, the hepatter should firmly fix in his mod the idea that vacuum tubes must be treated curefully. The commonest way in which radio tubes are abused in to turn the rheustat too far in an endeavor to increase the volume when it is not loud enough owing to fading or poor receptive conditions that cannot be blamed on the receiver at all.

Of course, if you drop a vacuum tube and the glass breaks, there is no question as to its further assentines—it is amply junk. But considerable damage can be done to vacuum tubes without actually breaking the glass, by rough handling

when you put them into or take them out of sockets. The glass is concuted to the base and an extra vigorous twist may lossen the coment and tear the delicate connecting wires away from the prongs in the base.

Remember that the glass bulb of a vacuum tube contains some small metal pieces surrounded by the nearest thing to to-thing at all that is now commercially possible. The slightest crack will perint air to leak into this high vacuum and rum the tube completely.

YOU can put your radio batteries, both A and B, at any convenient point. It is not necessary to have them within a few feet of the radio receiver. But no matter where you put them, you must do a careful job of wiring to avoid trouble.

If you wish to put the batteries in the cellar or in the closet of a near-by room, use heavy wire for the A-battery. It takes power to force electric current through wire in proportion to the distance it has to travel and the size of the wire. You can get good results by wiring up your storage battery with rubber-covered wire as small as No. 18 if the battery is not over three feet from the set; but, if you increase this distance to twenty or thirty feet, he sure to connect up your storage or dry cell A-battery with wire not smaller than No. 12.

Good anadation is worth while on the A battery wiring because a short circuit may result in red-hot wires and a serious fire.

The size of the wires leading to your B-battery is not important no matter how for they are from your set, because the amount of current they carry is extremely small and the voltage is high. Well insulated wire is a good idea, however, because a abort circuit will rain five or six dollars' worth of dry cell B-batteries in a few minutes.

HERE are a few more of the symbols orthograpy used in ratho wiring diagrams. Opposite each one is a picture of the part in the ratio ericuit it represents.

Basiculty, a so-couled "tackler cod" is just like any other radio cod except that in most eigents it is mounted on a shaft so it can be rotated. In some wiging diagrams, this motion is indicated by a thin arrow through the tackler cod and the cod it affects, but generally the fact that the cod is mounted so it can be rotated in mentioned in the description accompanying the diagram.

An made transformer used for amplifying the signals at audio frequencies in a receiver consists of two coils of wire wound on a closed iron core. While each manufacturer has his own ideas about the



Should Be Handled Like Edge

Care should be taken in putting various tubes into the socket and taking them out. An extra hard twist may lowers the comest and tear the delicate wices away from the prongs at the base

external shape, the theory of operation and the general arrangement of the parts usade is always the same. The symbol shown on this page for the audio transformer motivates the two cods, and the parallel boss between them indicate the core. The cours are actually wound around the non-exce, and a true diagrams should show this, but so many crossing lines would be confusing, consequently the method shown has become standard for radio congruents.

A fixed condenser consists of metal plates reparated by then sheets of mea. The symbol for this part is two parallel bues as shown. A figure, such as ".0003." printed next to the symbol gives the capacity rating of the condenser in microformia that is needed at this point in

The symbol for all knots of latteres is a series of short and long parallel lines. Formerly the own-ber of pairs of ones inducted the nonner of cells in the battery, but at present this rule is not followed. The same symbol is used to represent storage batteries and dry cells, so you must depend on the description accompanying the drawing for information as to the type and voltage of battery the symbol stands for

THE SYMBOL

WHAT IT STANDS FOR





TICKLER COLL





AUDIO TRANSFORMER





## A B C's of Radio

CAREFUL tuning has a lot to do with the quality of mune that comes out of the loudspeaker. If for instance, the dial that adjusts the wave length of the receiver is moved a trifle from the point where it should be to receive the station with maximum volume, the quality falls off slightly as the music becomes weaker. This is because some of the wave carrying the mune is lost, and explains why it is not a good idea to regulate the volume by tuning out the ingual

For best quality, the set should be tuned to the proper wave length as accurately as possible, and the volume should be cut down, if it is too strong, by means of the volume

control knob.

## Your Radio in Hot Weather

## How to Get Good Reception despite Summer Disturbances

By JOHN CARR

others, rathe has become a steady source of good maste and enter-tainment. You no longer consider your rathe receiver a neverty—a fascinating and uncausty piece of electrical machinery to play with in odd moments and to be forgotten the munite summer reception trubbles taterfers with breadcasting

And with the increased number of broadcasting stations operating on high power, there really is no reason why you should not get satisfactory results in apite of static and the other disagreeable

effects that accompany hot ammer weather.

Assuming that your receiver has been operating perfectly all through the winter, your first job is to make some that the set itself is not intensifying the noises. Radio service men claim that at least unsety per cent of their trousse calls turn out to be either dead batteries or worn out tobes. So test your batteries and make size that they are in tomotels form.

The A-battery that heats the filaments in your takes should be checked up with a hydrometer and distilled water added if the solution is down to the tops of the insulators. If you have taken good care of your battery and recharged it at regular intervals, the chances are that it is at good rood tion.

There is a possi lifty however, that the connecting wires have become cornalist at the terminals of the but-

ters. Corrosson at this point sometimes rauses noises, but more often the effect is to make the current flow fluctuate in much a way that the framents in the tubes become alternately brighter and dimmer and the volume from the loudspeaker changes just as it does when the signal actually fades in and out. Sometimes frying and cracking noises are produced when the top of the battery is covered with a moist some norde up of dust and battery solution, but usually the only cesul\* of this type of leakage is a loss of current that makes the battery run down more quickly than it should. It will pay to keep the battery clean on that account.

DRY cell B-batteries, when they are nearly run down will often produce sizzling and crackling nones that sound put like real static. The remedy is new batteries, of course, but don't buy a whole new set of B-batteries until you are sure that the ones now connected to your set are to blume for the noise. Testing them with a voit meter will settle this point. If a 43-volt block reads 3714 volts

or higher, you can be pretty sure that it is still in condition to give quiet service.

Storage B-batteries are in a class with alorage A-batteries because they work in the same way. You must keep them properly charged and filled with water and it is particularly important that you keep the wire connections free from corresion, for, with many types of radio recovers, a very loud high-pitched howl will develop if a logh and creent at this point.

Weak socket springs that make poor

TEST ALL WIRE MAKE SURF THAT TUBES CONNECTIONS ARE NOT DEAD TUNE IN YOUR LOCAL STATIONS INSPECT MOVING CONTACT OF RHEOSTAT USE INDOOR ANTENNA WHEN STATIC TUBE PRONGS! SHOULD MAKE IS BAD GOOD CONTACT TEST YOUR B-DATTER ES WITH VOLT-METER CLEAN TOP AND CONNECTIONS TO A-BATTERY

How in test your set to get the best results in summer

contact with tube prougs, moving contact fingers on rheastats, base busing posts, or other poor connections, are all possible sources of noises that may play hob with your reception.

Mer you have made sure that your set itself is right, the next step is to check up on the antenna connections. Consistent, long-distance reception with quality sufficient to be enjoyable is almost an impossibility in summer no matter what kind of a radio set you have. For most of m it is fortunate, therefore, that the local stations put on such fine programs. If you have a multi-tube set and you are located within a few miles of one or more broadcasting stations, you will find it worth your while to investigate the use of a short indoor antenna. You really don t need the outrloor antenna for local reception, and you have probably found it necessary to turn down the volume control quite a bit when you are tuned-in to these stations. With an indoor arrienna. you will find it necessary to turn up your volume control but in most cases it will be found that the static noises are reduced

enough to make it worth making a test

A satisfactory indoor antenna can be made by stronging from ten to thirty feet of ordinary bell wire around the picture molding. The nearer you are to your favorite station the shorter the midoor antenna can be for satisfactory reception.

THE fact that you put up an indoor antenna dues not mean that you have to abandon the me of the outdoor antenna altogether. You can get a single-pole, double-throw switch and arrange

the wring so that you can shift to the long antennawhen you want to number yourself on nights when the static is not bad by trying to bring in distant stations.

There is no adjustment you can make to your loudspeaker itself that will red on the static without cultary down the music or speech as the some proportion. But there is one stant that seems to work pretty well, and that is to move the loudspeaker into another room and then turn on more volume than you ordinarily the. Often the music will sound much better and clearer. This is probably due to the fact that the anatained vibrations of the mosic carry much better than the raspung and elicking notices of static.

And placing your loudspeaker some distance from your radio receiver is a mighty good plan all the year round. If you keep the

loudspeaker on top of or right beside the set, the strength of the music is such that it is difficult to tune properly. Moving the laudipeaker to the other rate of the room has another advantage. It prevents the possibility of what is known as "audio feed back." This trouble is often the cause of pacticularly mystifying howls and equents. The actual vibrations in the air produced by the laudspeaker may vibrate the detector tabe in your receiver, and the tube firms them into electrical impulses which are amplified and again come out of the loudspeaker The victous circle is repeated again and again until a terrific bowl is sometimes produced.

DON'T waste your money on devices sold for the purpose of cuminating static. The Popular Science Institute of Standards has tested many such devices, but so far not one has proved of any practical value. In every test it was found that, if the device reduced static at all, it also reduced the agonal strength in the same proportion.

## How to Improve Your Old Set

ByALERED P. LANE

## Study the Wiring Very Carefully

Improving your bld radio receiver in part at all difficult, but you must be careful to make sure that you are on the right teach before you start cutring and changing the am-

plifter wiring in the act COMEHOW that radio receiver you bought or built three or four years ago doesn't seem to sound as well as it used to. Probably you get the brondenst stations about as well as ever, but they sound tunny and the voices are either muffied or rangy.

The chances are that nothing has gone had in your set. Electrically and mechanreally it is still as good as it was the day

you first put it in service.

What has happened is that your radeo set is no longer up-to-date. Later models of home built and factory made sets for surpass it is the quality of reproduction. You cave heard some of these modern sets in the dealer's store or in your friends' homes, and the natural music and understandable voices have made your set sound like a toy phonograph by com-Date Specie

OF COURSE, the simplest remedy for this state of affairs is to buy one of the satist styles of radio sets after you are an ished that it will give you the kind of reproduction you want. Another way is to build yourself a new set using modern parts in a circuit designed to produce the hest possible quality. A third practical plan is to modernize your radio set and bring it up to present standards.

Assuming that for good and sufficient reasons you decide on the third course, your first job is to make a careful study of the internal arrangement of your indireceiver. Get out your ruler and carefully. measure the space now occupied by the a kin frequency amplifying transformers. Determine, also, the limit of space available, for when you try to install any of the modern types of audio transformers such as are illustrated in Fig. 5 you will find that they are in most cases much larger than the instruments now in your

And if you decide to use resistancecomplete audio amphification material of transformer-coupled, you will need to find exten room in your set for a three-



stage outfit such as as shown in Fig. 4.

As far as relative amplification is concerned, three stages of renstance-coupled amplification are about equal in volume to two stages when transformers are used. It will be for you to decide which type of amphification to use. Both give fine

We Will Help You!

SEND for the list of radio apparatus approved by the Popular Science Institute of Standards. It will help you to choose trustworthy parts to modernise your old radio

Also, perhaps there are some peculiar features about your particular problem. We will be glad to help you solve them. Explain your difficulties as completely as possible and include a large rough pencil sketch showing the instruments and wiring in your receiver. It will be returned to you with the proper changes marked at red pencil Address your letter Radio Editor, POPULAR SCIENCE MONTHLY, 150 Fourth Avenue, New York City.

quality when they are properly restalled,

At any rate, the protects of moderniaing your radio receiver a chiefly a matter of removing the parts in your set that perform the function and a listituting modern instruments and wrong arrangements. Distortion and poor quality reproduction are sometimes produced in the radio frequency amplification and detector stages in radio receivers, but must of the trouble is in the andio end.

Pomply you are unfamiliar with the various parts in your ractio set. Fig. 5. will bely you to determine which are the andro transformers, as the matrume at in your set will be of the same general type. Each one has four wires running to it, and your task of to remove these two matruments, bull the modern ones in place, and connect the wires to the fermions of the new transformers. Disconnecting and removing the old transformers is a simple proposition. Bolting the new transformera in place is also easy. But you may have some trouble with the wiring if the receiver in factory built and the terminals of the old transformers are not marked. Fig. 8 will been you on this point. Note that there are always four terminals on an andso transformer. Two of them are marked "P" and "B," with "Primary or "PRI" marked on the frame of the are marked "G" and "F" with "Secondary for "SEC" in line with them on the (mater.

ALL modern transformers are marked and, if the old a attromerate in your set are also marked, it is simply a matter of connecting the new in place of the old, If not, you will have to identify them by the wiring. The 'B' terminals are always connected to the binding posts on the back of the set which are marked "B AMP" and "B DET." The "F" terms nals of the transformers are connected either to the figurest wrong or to the

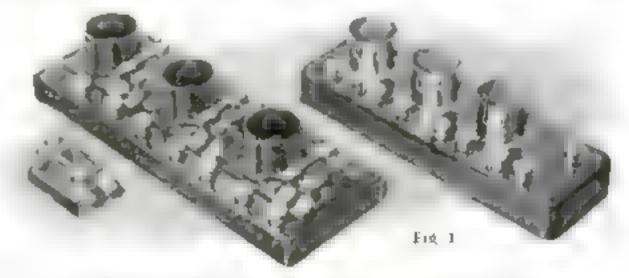
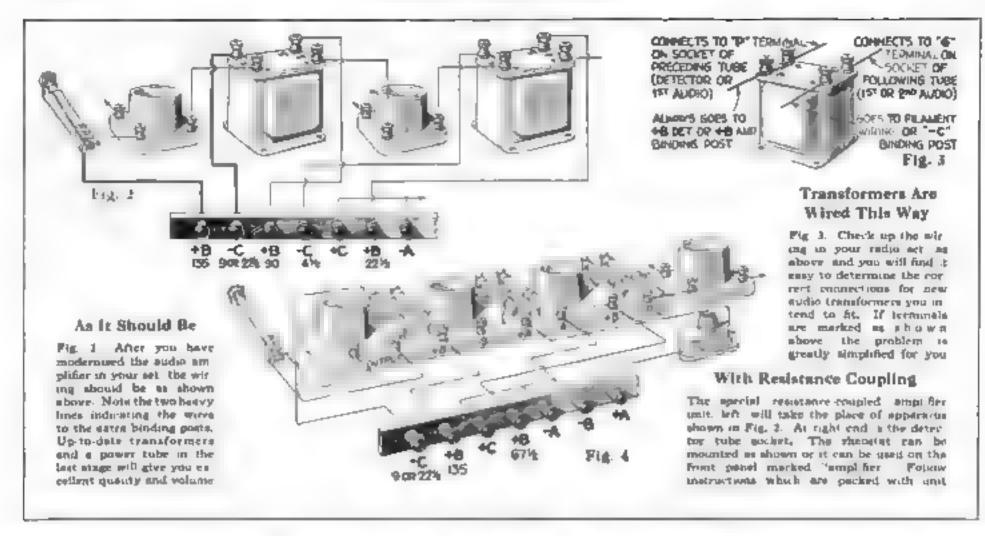


Fig. 1. The completely amenabled crassmore-coupled ampletier unit above will give remerkably fine reproduction. It will replace the mudio amplifier end of your set



binding post marked "Misua C." The "te" terminal of the last audio transformer is always connected directly to one of the terminals of the socket that holds the last tube, and the "Goterminal goes to the similar terminal on the next to the last tube. A study of Fig. 2 will help you. Be sure you are right before you

disconnect any wires at all.

The mere auberitation of modern transformers for out-of-date ones in an old set will effect a great improvement in the quality, even if no other changes are made. but the improvement will be still more marked if you also arrange your set for the use of one of the new types of power tubes. And this extra advantage can be ga ned with little additional work, as you will have to disconnect all of the wires involved when you justall the transformers.

THE peoper use of a power tube requires just two changes in your present wiring regardless of how it is now connected up. One is to fit a new binding post at the back of the set as shown in the diagram of Fig. 2, and connect the londspeaker jack or one building post to it. Then you fit another extra bindary post and connect the "F" terrinnal of the same transformer to it.

There are power tubes available for use in place of standard storage butlery t their or those of the threevolt, dry cell type, and the manufacturers pack with each tube an mistruction encet giving the proper B and C battery voltages to use with the particular tube in the package. Follow the manufacturer's recommendations on this point.

There are several makes of resistance-coupled amphilier units now on the market. They take the place of all the wiring and instruments in your set beyoud the detector tube. Fig. 1 above a typical hook-up for a circuit arrangement of this lond. On resistance-complete amphifer units, there are always a number of binding posts carefully marked as are the building posts on your radso set. After you have removed the two audio transformers and the two last tube mekets and fitted the resistancecoupled amplifier in place of them, you should connect the detector circuit to the amplifier unit and wire up the batteries to the building posts on the amplifier unit as well as to the londing posts on the back of your set. Be careful not to conneed the wire from the minus end of the B-battery to more than one building post. You can connect that were to either the minus B binding post on the back of your set or to the minus II binding post on the amplifier unit, but not to both.

There is one other arrangement that will appeal to a number of radio fans. particularly those who are located in the larger cities where many stations are recerved with so much volume that the set is rarely operated on full power. In a case of this kind, it is possible to sidistifate one stage of resistance-coupled amplifica-

tion for the second templormer-complet stage in your set. The result will be a great improvement in the quality, although the volume will be somewhat less.

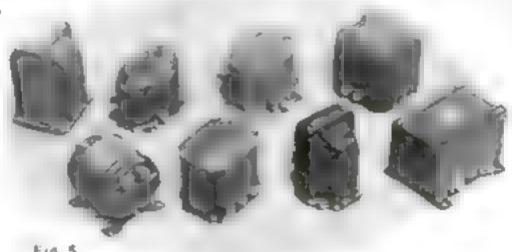
If you are interested in changing your set in this way, look over Fig. Lagurs and you will note a small distribute that the left end resembling a tubular grid leak mounting built to hold two grid leaks instead of one. And that is just what it actually is, except that a coupling condenser is concealed in the base. Thus resistance coupler mounting can be substituted in your set for the last traisformer. The procedure is the sume as for another transformer. The four termonis are marked as are transformer terminars and should be connected to for same way. Because of its small size there will be no difficulty in fitting it into the abowed дивет.

O USE a power tube in the resistancecoupled stage is also a good idea if you want best quality, and the directions given for the use of a power tube with a transformer apply in the same way. Idother words, the "B" terminal of the reastance coupler unit should be connected to the extra, high-voltage hinding past, and the "F" terminal of the coupler

to the extra C-butters binding post. In this case the high voltage is applied to the plates of all the amplifier tubes.

The chances are that you will want to huy a new kerdspeaker to obtain the full benefit of the high quality reproduction from your improved radio receiver

The Popular Science Institute of Standards radio laboratory has tested and approved a number of moderu audio transformers and re-istance-coupled outfits. and a list will be sent to any of our renders on recerpt of request.



Modern Transformers Give Fine Quality

Startling unprovements have been made in last two years in audio transformers, types of which are shown shows. They reproduce high and low notes for better





## Martimoth Radio Calls Set Hult for Assessment 16

The frequency take purpose of the versus to the lay to the the lay to the lay Retent L. Could be an in the lay to the lay to the lay of the lay to the lay to the lay to the lay of the layer lay to the lay to the layer lay to the layer lay to the layer l

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### 2,000 Feet Underground

At the left German W. Mother proJohn Phisa teaming the grain a segardener on the the law of the man Monte of the act of the law of the law



### Click Starts and Stops Receiver

A Japanese memory was have Tokum has not perfected the selflink above the works are he so as an parter of the and do not to the persons are a son was A see as dudge sur

#### Camplete Station in Miniature

At a correct above P and Pringerman extracted the pattern at ougly onspice mode of he and spint on APP of Every detail is no perfect that a place of department of the real status.

## Helpful Fittings for Your Car



## Shock Absorbers Easily Pur On

This powerful shock observer will appeal to the owner who there to do his fitting himself, as a complete set of them can be fitted in about twenty minutes with the sid of ordinary ween her. No dolling of machine work is precised for mutalling them.



#### Thief-Proof Lock for Space Tire

This new fack, above, taken the place of the ordinary chain and padlock used to protect the apara tire from theft. It fits on instead of the nut and the two heavy prougs prevent turning



#### Extenses a Handle for their

When copens on I are a series of the copens of the copens



### A Unique New Wheel Puller

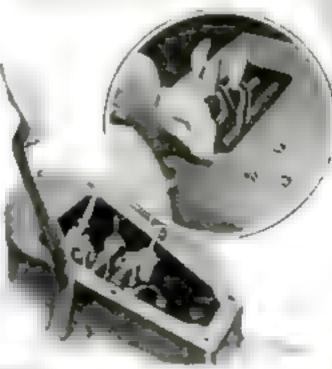
Designed for use on all cars built with hub caps threaded exteen threads to the such, which includes nearly all cars except the Ford and Chevrolet the device shown below recuts roused or battered threads to writ as pailing wheels. The large built in the center is used to apply pressure to the end of the shaft while the other built in direct of the shaft while the other built in direct devices the design of the shaft while the other built in the three designs.

cornect districtor of asic



## Crank Adjusts Bands

The remerkable outfit below, is fitted to the transmission of the Ford car and, by way of boles bered through the floor board, a small hand crank can be used to turn the projecting rods. It requires but a few accords time to adjust all three bands



#### Tells If Lights Are On

This simple device left in attached to the front lens at the top. Light traveling through the best glowing spot. If the glowing spot disappears, you know at once that the headingst bulk has borned out, and needs transeducte replacement.

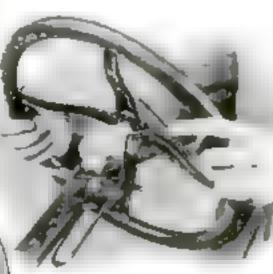
### Accessory Does Three Things

Replacing the regular Ford timing gow cancover the augminum device at the right inc a water gamp to supplant the thermosyptom cooling, a positive gear pump to take the plant of the splash-gravity oil feed, and a mastern quation system to replace the busing coils and roller timer. No matchine work is intermitry to be



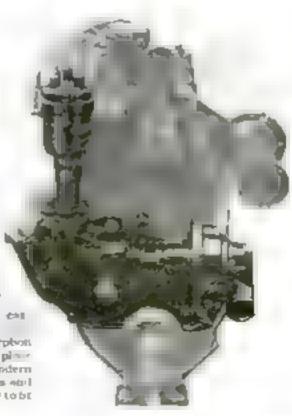
### Light Aids Hand Signaling

This accept metering help is ordinarily in a bracket on the deals where it serves as a destrilight, but it can be instantly shifted to the handted serves to alkalamete it as that the driver behind will be ours to shores the signs at once



#### Extension for Horn Button

On care where the born button is attached to the side of the streeting rotation underbright the wheel, the simple accessory substrated above enables the driver to blow the hord without taking his head off the stoering wheat



## How to Foil the Auto Thief

Gus Points Out a Half Dozen of the Best Ways to Lock Up Your Car

By MARTIN BUNN

OT your car back again, I see said Gus Wilson as George Thateber drove up to the Model Garage.

Thatcher in a giorn voice. "Those crooks size the shoot this bins all to pieres in the two weeks they had it. Nothing works right. And just hook at the scratches and dents in the body."

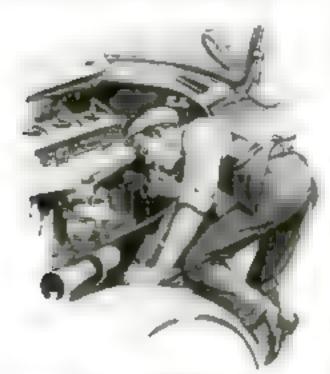
"May be it no tho bad" and the veteran mechanic hopefully has be raised the bood and inspected the power plant." How come you doln't lock it the day it was stolen."

"How did you know it wasn't locked?"
demonded Thatcher

"Humph" growled Gus. "Nearly all stolen cars weren't locked. What a the good of locks if you don't use em? Pretty soon the insurance companies are going to make extra low rates on what they call consciental locks, the kind that throw on automatically when you turn off the ignition to stop the motor.

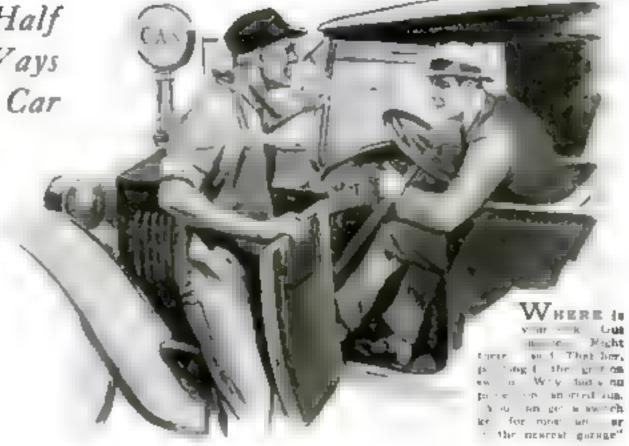
"Don't worry! I won't forget again." said Thatcher positively. "I've had my lesson. After this I'm going to lock her up every time I get out. —even if it's only to step into a store for a pack of rig-

"That a the right idea." Our encouraged as he got out his tool kit and begon any isting the carboretor. "After a whole it will become second nature to turn the key in the lock when you get out, and it's a cuch no crook will take your carboless you leave it out all night or some-



A Secret Shut-Off Valve

"The gasoline wouldn't flow from the main tank, I nearly busted a lung trying to blow the dirt out of the pipe. Then I got the pump"



thing like that. No lock is any good if the crooks have plenty of time to work on it. If they can't pick the lock or break it, they just come along with a tow car acting like it was a regular trimble call, hout up the front end and take your car to some place where they can have all the time in the world to break up the lock

"Where is your lock, anyway?" he piquired, examining the steering wheel and transmission

"Right there," and Thatcher pointing to the ignition switch.

YOU don't mean to my that a the only lock you ve got" snorted Gus disgustedly "Why, that a no protection. You can get a switch key for most any car in the nearest garage. We keep quite a stock of them. And it's no trick at all for the crook to connect up a piece of wire around the switch. Ignition locks are no protection at all unless they are specially made so that all the wires and even the timer itself are enclosed in steel so the crook can't get at the terminals to wire around it."

"I never thought of that," Thatcher admitted with a sheepsh expression "Well, what would you call a good lock?"

"Best thing I know of in a steering wheel lock that disconnects the wheel so that it turns free when you throw the lock on." replied Gus. "A transmission lock is good, but it won't stop crooks from towing your car away. All they have to do is to park their car in front of vours and, when no one is looking, book on a tow rope and drive off, with one of the gang sitting in your car to do the steering."

You'd better fit one like that after you get done with the rest of the repairs," said Thatcher. "Or can't you fix up some kind of a secret lock on the ignition or the pisoline line that the crook won't know about?"

"Sure I can," Gus replied, "provided

I put it where you can work it without making any queer motions with your hands when you stop and get out. That's because crooks often hang around where cars are being parked, and if they spot you lifting up the hood or mything like that they are sure to get on to what you are doing. Then what good is the secret lock?

"They must have been laying for me all right" observed Thatcher "The week before the car was stolen, they got away with a braid new space tire, and I had it locked on, too."

"With one of those dog chains and a twenty-five-cent padlock. I suppose," and Gua arcentically. "You've got to have a mighty husky chain and padlock to fool the crook who has a powerful bult cutter in his car. He just cuts the chain like so much cheese and walks off with your tire as easy as can be. The best dope I know is not to keep a new tire on the spare tire rack. Always have your oldest tire on the rack. Nobody would bother to swipe an old shoe."

"THATS a good tip. said Thatcher "What about those secret locks" Wouldn't it be a good idea to have one in addition to the lock wheel?"

"They re good all right—sometimes," Gus grinned at Joe Clark, his partner, who had just strolled out of the office. "Tell Thatcher about the one that fooled you, Joe."

"That was one on me nil right," admitted loc "trus was away and I went out with the tow car on a telephone trouble call from a man who and he was stock. And he sure was stock. The gasoline wouldn't flow from the main tank. I nearly busted a long trying to blow the dirt out of the pipe. Then I got out the tire pump, but that didn't work either, so I hitched on the tow rope and pulled the car all the way here to the garage. The owner went down the street to do some errands. ((onlineed on page 129).





Storen dad pitaryila dali in sten in valla int e Juhundu's A trine Il ang Friendes They a to guid's gare gate as Free cape of the Johnson 25 Houk are thoughtury.

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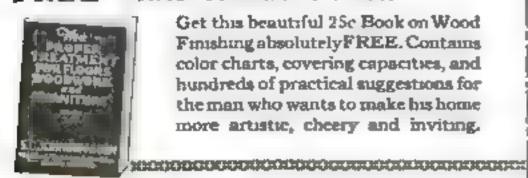
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## Ingenious Helps for Motorists

## Eight Useful Kinks That Save Time and Annoyance

THEN traveling in sections where gasoline alations are mues apart. it is wise to carry an emergency can of gasoline. Pouring from many atyles of these cans a, however, not easy because of the location of the filler cap on the many bank. A simple solution of the problem is to use a section cut from an old mi er tube, Fig. L. Near one end of it cut a slit just large enough so that the mozzle can be forced into the opening. Tuck the other end of the inner tube into the filler opening, and the gasoline can be transferred from the emergency tank to the mast, tank without spilling it all over the rear end of the rac.

IT 18 been nong armost standard prac-tice on loss and mession priced automaintes to place the storage battery underneath the floor boards where st is hard to get at, and as a consequence thousands of motorists allow their butternes to go for long periods of time without adding water or cleaning the term hals. Such treat ment is not good for the battery. To eturnate this difficulty, cut a square opening in the floor boards directly over the battery, hall two cleats underneath as shown in Fig. 9, and not out a piece of board the right use to fit in the opening. Horea finger hole. so that you can lift out the board.

JUST because a moving part of an automobile is out of eight does not mean that it can work for long periods of time without librication, even if it does not move continuously while the car is in motion. The rods and lever used to operate the brakes are in this class, and, because they cannot be lubricated without erawling under the car, they are frequently never piled at all. Considerable wear takes place and after that they rattle most annoyingly. Instead of enwling under the car, labelcate them through holes bared in the floor boards as shown in Fig. 3. By locating the holes, oil dropped through the center of each hole will strike the right point if the car is level.

I when driving with the wind, many drivers desire to take off their coats. Ordersers, where the jouncing soon throws it down on the floor. And if the car is crowded, some one is sure to sit on the coat and get it full of wrinkles. The number remedy is to buy an ordinary

10 1 10 3pm.

Fig. 7. Name scratched on back of Secrete plate may bring it back to you

coat hanger and serew it into one of the bows of the top, as shown in Fig. 4. By benching the top book down close to the lower one the hanger will hold a coat even

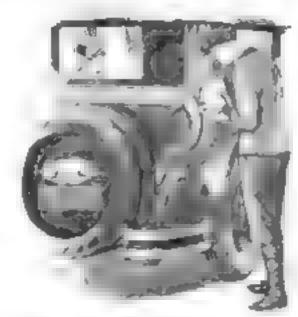


Fig. 1. New way to transfer gasoline from renergency to main tank



Fig. 1 This trop door makes it easy to inspect a bettery or add water



Fig. 4. This cost hanget will hold your cost even if loop to broken



EROSS SHAFT AND EQUALIZERS

Fig. 3. Here is no excellent way to oil all the bruter mechanism



Fig. 1. Spring washers climinate name by taking up play in shackle

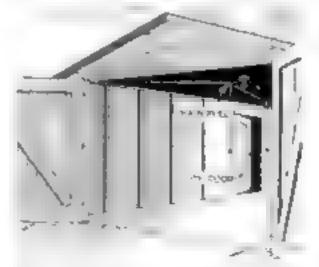


Fig. 6. A helpful arrangement for garage light

## Ten Dollars for an Idea!

ERIC B. BOBI-RTS, of Region Nashakherean, wind the \$10 perce that month for the brake shaft adding what in hig 3, Each month POPULAR SCIENCE MONTHLY awards \$10 heades space rates for the best idea for motorists Other published contributions will be paid for at usual rates. if it is not fitted with a loop. Set the opening so that the collect of the contean he forced between the brooks.

AFTER au automobile spring shackle A bolt has been in use for some time. wear takes place and allows some play between the parts. The result is rattling nones every time the ose strikes a bump in the road. It is possible to eliminate the tenuble by the proper use of heavy apring washers. The sharp corners should be ground off and a washer fitted under the bult head, as shown in Fig. 5, on each shackle that has worn loose. Be sure that the hole in the washer is large enough to slip over the shoulder on the holt, and be execful not to set the put up too I glid Coffer point are absorately necessary in this arrangement, so be sure to arith a new

hole for the catter put of the net covers the old one

STUMBLING over a can of oil or backing your shins on some of the garden tools can be eliminated by fitting the ceiling light in your garage with a chain pull type of socket and then running one pull to each point at which you enter or leave the garage either on foot or in the car. As shown in Fig. 6, a good arrangement is to put a screw eye in the ceiling a short distance from the light and then run three cords through the opening and the them to the end of the charm, Supported by another screw eye, one rord can be dropped by the back entrance door and the other two to each aide of the main doors, where they can be reached easily from the car.

LICENSE plates on automobiles often work home and drop off the bracket. You will flad it worth while to negately your name and address on the back of your new becase plates with a sharp in strument so that if you kee a plate, the finder will be in a position to return it.

THE common method of deflating a tube is to serew out the valve, but this method often results in rolling the packing ring out of place or in destroying it completely so that the valve cannot be used again. To construct the special cap

shown in Fig. 8, remove the inner rubber washer, drive a mail through the top just far enough so that it will open the valve and file a notch in the top to allow the air to escape. Be sure to file off the point of the mail so it will not slip off the valve stem.



Fig. 6. Altered cap saves time in deflating table prevents injury to valvement or weaker



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Tyens Office Thermometers

An aid in promotmg human effic-JCIn. V

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To help a so to mainta o a temperature in your hange a inducive to good. Sept 1

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Beech-Nut Packing Company

Practically Eliminate Spoilage by the use of

## Tycos Instruments

Says H. J. GARLICK of the Beech-Nut Packing Co.

TN THE process of preparing and canning spaghetti, cat-sup, chili sauce, pork and beans, jams and jellies it is essential that all temperatures throughout the cooking be maintained accurately, in some cases within 2 degrees A variation would mean considerable spoilage and wastage.

"In order to obtain this necessary temperature control and to have a permanent record of the temperatures through certain processes we rely

on New recording, long-stem and index thermometers These instruments are located on the retorts in which the canned goods are processed, the sterilizing tanks, and bottle-filling machine heads. Bees pressure regulators are used for automatically controlling the steam pressure in the retoris

"During their 5 years of service the From instruments have been very satisfactory -the spoilage in the plant being practically on although yearly production amounts to 500,000 cases of 24 bottles or Cana each.

TO MANUFACTURERS

New Engineers have effected substantial economy for manufacturers to every line of industry by applying the fine 5 xth Seise. Whatever you problem in the indicating recording or controlling of heat, there is a fire Inservanent to serve you. Write its for interacture on any instrument, or rape of instrument, and it will be sent promptly. Or 1 viso prefer our engineers will consult with you on the apparention of the Fee Sixth Sense ID HANG PRACT

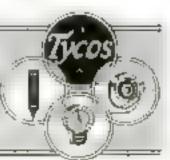
## Taylor Instrument Companies

Main Office and Factory

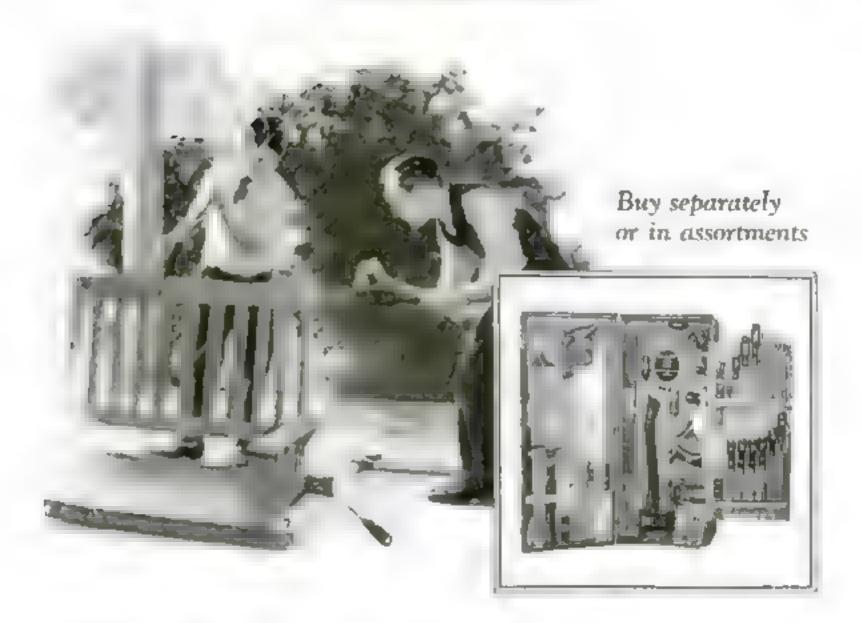
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6

## STANLEY TOOLS

THE MOST COMPLETE LINE



## ARCHERY-The Latest Summer Sport

Old Art Has a Great Revival—How to Make Your Own Bow and Arrows— The New Target Games

## By DAN BEARD

National S. at Communicate Boy Scouts - Imerica

THE boys on the Oho over made their how from the stayes of sugar hogsbends, from thek by boop poles from steel rangeds of Civi Mar muskets from burgel hoops or barrel stayes to fact, from anything they could by their hands upon, that was springs.

They made their arrows also of any material, preferably whote piac, because white piac was pleatiful and the piac agrees, called in those days dry goods boxes, were made of the best piac straight grained and exert of knots. This would had a wonderful smooth cutting ip a dry when whitted with one speckly ife.

We lever saw a how that was number for the market such as you had sporting goods steres. In the ancient and much thomated Boys Own Blook, there were publices of some one bows, but we do! not believe they really existed outside of picture books.

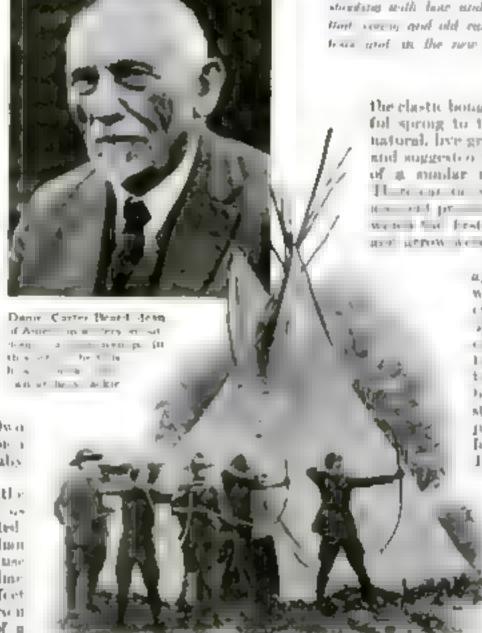
Of course, it is only guesswork on the part of anyone who attempts to tell as just how the bow and arrow originated But not long ugo an old Navajo Indian told an acquaintance of mine that the use of the how was discovered by an Indiae charlong up a tree and placing his feet upon a forgh vair, which extended from the trunk of the tree to the end of a bough. Jamping up and down on the vine, he was delighted to discover that

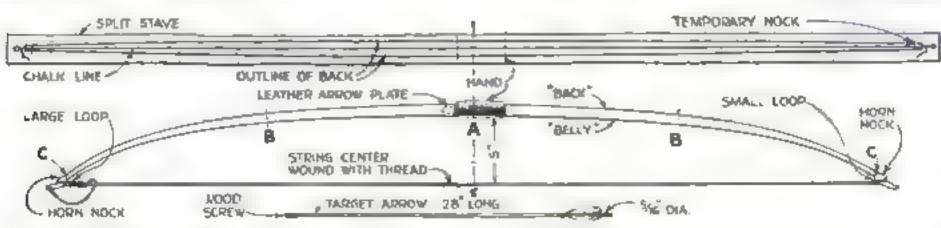
MEN and women all over the country are turning that summer to archery as an audion sport. That is partly due to the explude of Arthur Young, Dr. Sarian Pope and Stewart Edward White, previously described on Procure Science Mosenney that the main reasons are the fancioustion of stantage with last and across and the fact that severy and old can take part in emberse and in the new youne, archery gulf

the clastic bonali of the tree gave a powerful spring to the vine string. It was a natural, live growing how and howstring, and suggests of this ludian the massing of a monlar nuplement as a weapon. It is east or of a doubt trut some such as cert proceed the real germ idea from warm the first radely constructed low and across see a tinde

The present day Navago bows, however are a wide departure from the collections to be found in elections and noticinal track of Navago materials tree are well and established with somew and strong with a sinew cord, post melt a brew hangs a few feet behind me as I write. The Esk monals a sects new

Every one of my readers knows that Robin Hood and his nearly men were armed with long yew hows and quarterstaffs. It is, indeed, the long bow of England—the Robin Hood how—that now—(Continued on page 8))





To make a bow, a piece of hickory or other springy wood a split out to insure straight grain. Then the stage is tapered as shown. A handgrap,

been tips, and howevering complete the bow. Accous for men's bows, are usually 25 m. long. For smaller bows, they are half the bow's length

# A Yacht Model for Racing

You Can Be Both Builder and Skipper of This Easily Constructed Yet Speedy Sailboat

By CAPT. E. ARMITAGE McCANN



Fig. . Full-size drawings of the bull of this receptionally fast 20 in yacht model can be had by sending 15c to the Bluepunt Borvice Department. Poeucan Science Moscour. 250 Fourth avenue, New York City, for House Workshop Bluepunt Mo. 46

Salling a yacht model on pool, ever lake or een is among the best of aports. Only those men, those very old men, acted—an whom the bright fires of boyish enthusiasm have turned to aspes, may not agree with met I know that all young and grown-up boys will.

Yachts may be purchased all ready to put in the water, but that is poor aport compared with trying out and sailing one built with one's own hands. As a compensate, sciniready parts may be bought and assembled. For those who adopt that plan, the following remarks will be found useful because, though the type of yacht may be different from the one described, building methods are somewhat similar.

The best fun is to start with the raw material and make the whole boat from truck to keel.

It sa proud moment when we launch on the water the yacht we have spent pleasant hours in building and see her skim along, straight as a dact -wind aft or ending to the appointed mark. It

or entries to the appointed is interesting to learn her moods and to true the sails and adjust the rudder. To add to the excitement, we may enter her for races, perhaps to be overtaken by these that were oudled better than ours, or more fortunately to win for us the covered bare ribbon.

The material required is easily obtained, and the bandyman will have the necessary tools—a handsaw, a tenon or other small toothed saw, chief, gonge, plane, light harmore, two small clamps, a fine headawl or twist drills, and a brace and J<sub>4</sub> m, bit

First of all, draw plans of every part to the full size of the desired hoat. You can save yourself this work by sending 25 cents for Home Workshop Hineprint No. 48 to the Bluepriot Service Department, Portlak SCHENCE MONTHLY 250. Fourth avenue, New York City The blue peint contiuns full-size drawings of the hull. and shows all the parts much more clearly than it u possible to do in the gestneted limits of а пладалите раде.

The menatrements given are for a 20-m, yacht (21 in, over all

and 1956 in, load water line), but larger or analier models may be made by increasing or decreasing all measurements proportionately. The plans are suitable for a boat of from about 10 to 30 in.

If you plan to join a model yacht racing club, consult the accretary and build your yacht in that it will meet the specifications of the club in regard to dimensions and sail area and, therefore, be eligible for mening against models of other members.

If you do not make use of the prepared blueprint, it is best to draw the plans on tough tracing paper, which can be laid on the word, the lanes then being scribed through by means of a abeet of typewriting carbon paper

The hall consists of the main block (which may be in two or three pieces), the side planks, and the deck. The main block A. Fig. 3, below, is a piece of straight grained soft white pine,  $2^{3}z$  by 7 by 20 m. If two pieces are used, the upper one should be 7 by 30 m., it should be 1 2 m thick at the fore end and 1 m. at the after end. Plane the bottom true, and on the sides mark the sheer line, A<sup>3</sup>. Out away to this line. On the top lay your foll-size plan drawing, centering it accurately, and scribe the outline, A<sup>3</sup>. Cut away to it.

THEN cut away the imade, leaving the sides about \$\frac{1}{2} \text{in the ket the top and bottom edges, the worst ran be thinner between except at the bow, where enough should be left on which to fasten the upper stem.

The lower block, if two pieces are being used, should be 4 by 6 by 18 % in. Plane the top and see that it fits the bottom of the top block. Mark the outbre and cut away the waste. One the two firmly together and help the glue with a few brada driven down through the lower edge of the top block, being careful to point them so that the ends will not appear when the hull is cut to the first shape. Put these pieces between boards and clamp together or place under a brack weight for twenty-four hours.

Regarding the glue to be used, the best in cases glue, often called airplane or cold water glue, (Contained on page 92)

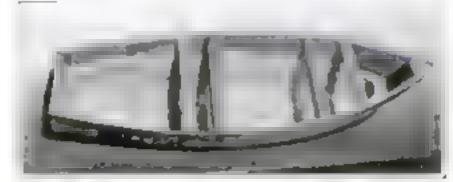


Fig. 1. The hall with both temporary molds and permanent deck beams in place. The molds are removed before the deck in fastened

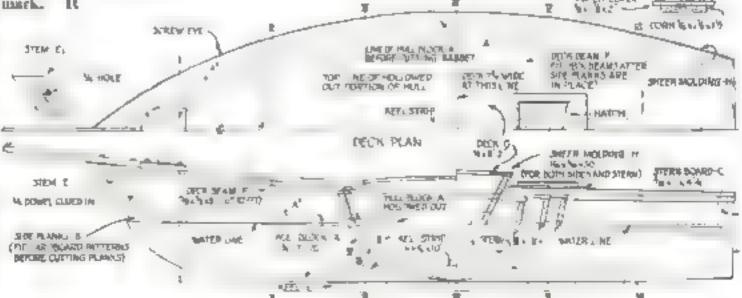


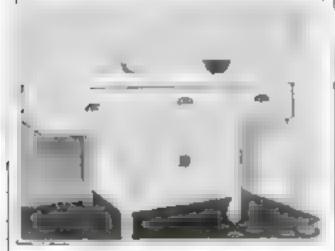
Fig. 3. One half the plus view the side elevation, and a terrica of section lines. Note that the action lines show

the shape of the hull at station points marked I-VI, and at the stern. These points are exactly 3 in, apart

### Mr Home Workshop

### How to Make a Zinc-Topped Kitchen Worktable

By Rupus E. DEERING

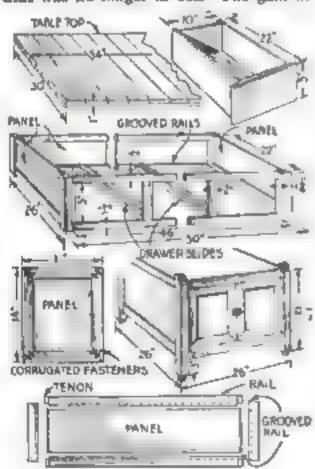


This table cesembles closely in design an approved type of domestic arience worktable

I table that is giving excellent service in our home. The advantages of a zone-topped table over wood are that the top does not stain readily, is easy to clean, always looks well, and never needs refinishing.

If the sine does become stained, it can be cleaned in a few minutes by applying a weak acid such as vinegar or lemon juke, and then washing with clear water.

In making this table, I used lumber taken from an old-fashioned oak bedstead that was no longer in use. The gain or



The table top, framework of top and bottom sections paneling, and drawer and door construction are shown in the above details

doing this was that I did not have to ent groover for any of the rails or the frames for the doors. This is always a help to the home woodworker who has few tools.

I designed the table to resemble somewhat the type often used in the domestic science departments of colleges. The whole top part with the three drawers may be lifted off. (Continued on page '9')



# Easier to build with Good Tools

IN summer, a very young man's fancy seriously turns to thoughts of model boats.

Whether he builds one himself or you do it for him, good tools will make the work easier and more effective.

NICHOLSON Files, for example, shape the mast to fit exactly, taper the bow-sprit and smooth down the ends of the planks.

Your hardware dealer sells good tools. And knowing their reputation and how useful they are, he naturally includes a complete line of NICHOLSON Files.



NICHOLSON FILE CO.

Providence, R. I., U.S.A

~a File for Every Purpose



### We Build a Woodcraft Cabin

It's a Comfortable Shelter for a Summer's Outing, Yet the Materials Cost Only \$25

By ERNEST THOMPSON SETON

FRIEND of mine, who had charge of certain Y. M. C. A. activities, was planning for a new camp. He submitted his outline to me, as he knew I had long specialized in such things.

The first ten was "ten tents to hold

eight men each \$150 aprece. "How is that?" he asked

"No good at all " I replied "Those tents will cost \$850 each before you get them floored and furnished, and will last only five years,"

"What else can we do?"

1 replied:

"Make a wooderaft caho. A fot of athletic young men should be ashamed of going earnping with nothing but store staff. It would be a priceless experience to them-and that is what they go for if each group made its own cabin. Properly made, the cubins would cost about twenty-five dollars each for material. Your busk es would supply the labor, and the cabior would last fifty years. I could build one myself to a week

My friend was a man of vision. He seemed profoundly impressed after a moment's thought, he said

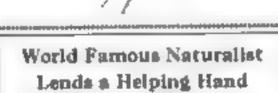
"Yes," I replied.

"One man could build it in a week Could two build it in half a week. "Yes, indeed

"Will you take me for your second, and let us go build it together?"

projecting a first it each gable Purlin as ion(a) **idylepole** East Elevation 's she'f for before stabs. Sur Case, and on for Bunk 2760 East Elevation

More the end of the cable was framed and then Exclaired with common methal) slains, bark side out



F YOU were going into the woods I for a company terp and could choose a composion from among the stock distinguished living authorities on woodcraft, one of the first names to oc-Thompson Seton, Chief of the Woodcraft League of America. In this orticle, indeed, Mr. Seton extends a helping hand to you and tells you exactly hose to construct a camp shelter.

"Glad to"

and that was how it came about. For the result of our little talk that day was the Woodcruft Cabin in the Blue Ridge mountains, back of Asheville, N. C.—a cubin that has more been copied in nearly every part of the United States. It is a cabin that should be used as a model of cheapness and effectiveness wherever new camps are being founded.

It was on the 10th of April, 1020, that my friend , whose Indian name is Gitchesaka) and I landed at the little station of Black Mountain, N. C. and lived a temp to take us to Die camp ground, three index up in the words,

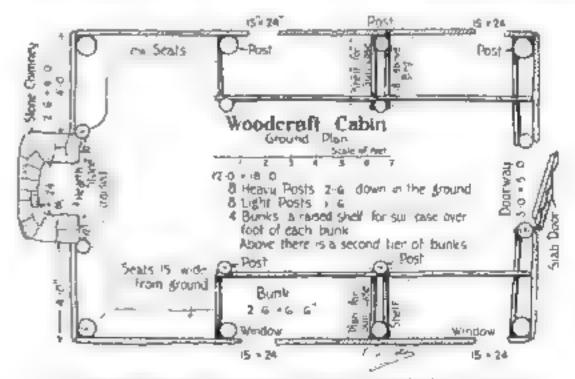
First we obtained fools, two good axes, batchet and a hapmer, a two-banded saw and a handsaw, a 2-m guger, a brace with some bits, a spade, a picker, a crowbar, a level, a square, and a plumb line.

For material, I bought 10 lbs, of 5-a. mails, 10 flut of 4-m., 5 lbs. of 5-m.; 3 rolls of slate-covered mobing paper, and 2 cords of 8-ft, slabs (about 100 in butteher). These came from the mill, and were delivered by nell team. The total apent was less than \$25.

Near a sweet little apring, I had out the shanty, 12 by 18 ft. Then we went into the woods and cut a lot of chestnut poles. There were plenty of these, all the chestnut being dood.

We dug post holes at each corner; then other holes to divide each aide and each end into three parts, as in the plan.

The posts were cut off even at 6 ft. from the ground. Stringers 14 ft. king were laid across the ends. then, across the sales, a 20-ft, stringer, which gave a prosection of 1 ft. at (Continued on page 191)



The plan of the original woodcraft cabin. It contains eight bunks in two tiers, as well so built in much and a picturesque stone foreplace. The sketches are by Mr. Seton

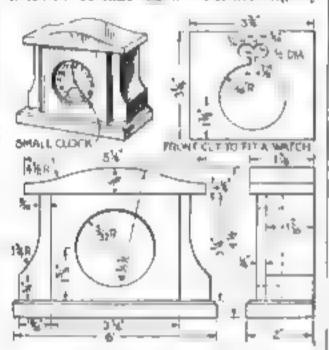
### The Mome Workshop

### Scraps of Wood Form Neat Clock Case

By H. J. MACDONALD Amy York Military Academy

"I'll's easily made but beautiful little. clock case can be constructed from serap pieces of wood. A wood that maures an attractive-looking case is aromatic red eedar, but mahogany, walnut or any hardwood will serve very well.

The diameter of the hole may be changed to fit the clock that is to be inserted. The case also can be designed to hold a popular priced watch, the only charge actuate borng of the center piece. f are nest be taken in boring the hole or holes to see that the wood is held tightly.



By making the hole or holes in the troat block the specuci stay, either a small clock Or a cheap watch can be used as the timepieve

in the vise. Use a sharp expansion but for the arge hole and only bore through one ude mitil the point of the bit shows then toen the back over and bore from the other side

The top and end pieces are cut out with a cluser and then sanded down to size. It is best to make first a cardboard templet as a gone

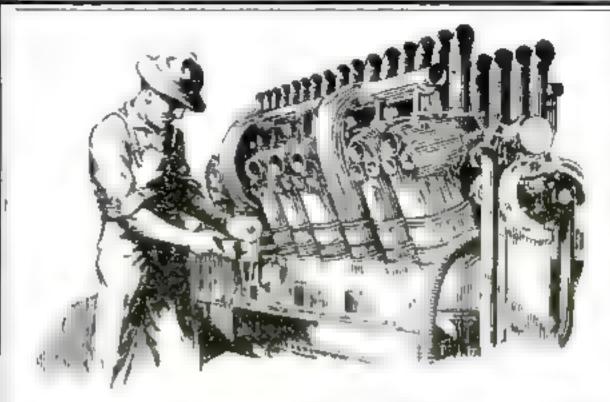
In he slying the clock of may either be stained to match the surroundings and varsushed and rubbed, or, if made from a prettily grained piece, it may merely be sanded and waxed.

The stock necessary consists of 1 piece. (4 by 2 by 6 in. bottom, I piece ¼ by I In. by 5 of man top, of pieces He by Log by #14. propules, and I piece by by 5 1/2 by 5 1/2 in. for the center.

#### Crack Filler for Furniture

N SEVERAL occasions I have filled O small cracks and holes in furniture satisfactorily with a mixture of five parts. varnish and one part whiting. As this filter was used only for wood in a natural finish (not painted) it was necessary to add sufficient dry thirting colors to match. the wood to which it was to be applied burn't seman for mahogany and orange chrome for oak -W J Eumonos, Jr.

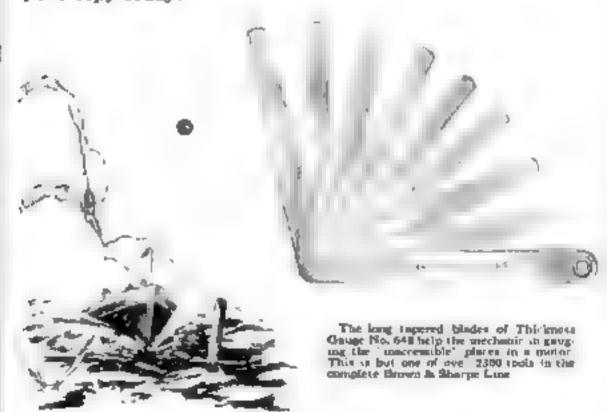
Turn to page 76 for the continuation of the Home Workshop Department



### Here's where OOI might mean a mile at the finish line

NE thousandth of an inch, plus or minus, may lose the race. Building a powerful motorboat racing engine and keeping it tuned to its best performance is the matter of constantly working to thousandths of an inch in fitting and adjusting its multiple parts. The Quality and Utility of Brown & Sharpe Tools recommend them for such work of the highest standard. They aid in determining the exactness of the engine parts and in setting the delicate adjust ments. Every place where the all important demand for exactness is encountered—there you will find Brown & Sharpe Tools.

Send for the new No. 30 Small Tool Catalog. Write for your copy today.

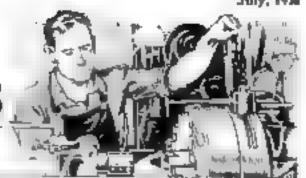


### Brown & Sharpe TOOLS

Providence, R. L., U.S. A. Brown & Sharpe Mfg. Co. Dept. P.S.

# Better Shop Methods

How Expert Mechanics Save Jime and Labor



### Old Bill Straightens a Big Shaft

### And One of His Customers Shows Him a Keyseating Kink

CRADUALLY the lathe came to a stop. A series of chala marks Bob Laten had put on the shaft while it was revolving now stood revealed as a peculiar spiral as ug its length.

"It's a whole lot better than it was remarked Ralph Jordan who stood behard Laten's shoulder watching his maneuv

ers.

"Yourt three more trues and be will have it straight again for you. Old Bill and He also was a good the waterlers.

While they were talking. Later made two longitudinal streaks on the Bin. shuft where he thought he ought to bend it is order to get it critically straight again. Then he measured the amount the shuft was out of true at these two places, so that he would have something to guide him after he had taken the shuft to the shop's straightening press.

If Laten had been a grifer testcol of a unrebunst, he would have referred to Jordan and Old Bill as his gallery, so intently did they follow has about. He got the shaft out of the lathe and onto a trock: then with the sail of several beloers, he colled it out to the adewalk, where.

firmly fixed to the concrete, was a pointerous device used to straighten large shalls. No one knew why it was on the astewalk, it had been there as long as anyone rould remember, and since it worked so well there, a change had never been suggested.

THERE was a cast-rou bed about 6 ft, long, with a cross member at the center for a series about 4 m in diameter. The reason for its being fixed so securely to a forndation, and perhaps the cause for its being on the sidewalk was evident when the helpers lifted a viceoch about 12 ft, long to set it on the squared end of the screw.

Laten placed a block under either end

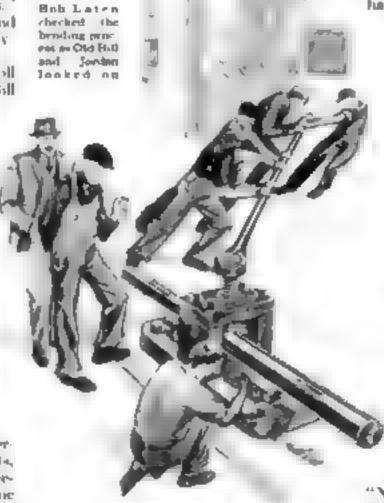
CALL OF CALL O

HUB OF PULLEY

In the obsence of proper tools, beyonding run be done effectively by means of a slotted mandrel and a broachlike cutter

By JAMES FALIS

Machine Shop Superintendent



of the shaft as it rested in the press. He turned it in that one of his streaks of chalk was up, then culpered from the shaft to the bed just below the screw. This was so that he could tell how much be last bent the shaft when he put on the pressure. There was quite a bit of grunting and strating, and many anotherings were last on the crooked shaft the machine, and the world in general before Laten was satisfied.

The bending well under way, Old Bill and Jordan walked back through the back Jordan's eye happened to fall upon the CBill's keysenting machine, at work a targe pulley.

have machines to do many things that we have to do by hand out at the plant. Jordan remarked,

We have to key seat pulleys from time to time, so I had one of the lays make up a set of 'drifts' once when there did not seem to be much to do. Then we made some mandrels with slots in them tapered one-eighth meh to the foot the same as a keysent. There is a mandrel for each common size of shaft, and the shit is deep enough to let the deft (you might call it a one-footh broach) be below the surface. Then we have a bunch of steel stript one thaty-

second melt thick that we put under the drift.

"To cut a keyseut with this outfit the usuadrel is slipped tato the Itole, the shoulder keeps it from gon g through. Then cusuagh of the strips are put under the cutter to make it take a small lute. It is forced through with the arbor press, or if we want to do the job out in the anil) a bansmer serves abunest as well. Then another of the stops is laid under the broach. and a second cid taken. Pretty soon we have the key seat (I rough the linb in a lot less time than it would have taken to chip it, and we do about no good a job as you can with your ar archiner

OLD RILL taughed at the various one time and gesticulations Jurdan made in the air to illustrate the construction and use of the tool.

"It does take men like yast, who have to keep the macroners running at their plants no matter what goes wrong, to get up the really good kinks at the bosoness. Old Ball and

"Now, here in the snop, we must have took to do must any old thing but there you depend on your own regenery to get you out of a breakdown.

Still, Jordan sand, "we have to come around a good shop once to a whole or else we are likely to forget all that we harned when we worked to shops."

"The door is always open, wherever you want to lake a postgraduate course."
Old Bill religated merely

Eaten came-up then with word that the shaft was as good as be could get it

Suppose you take a little cut off the porchals, and send it out to me "Jorda" said. When he was gone, Old B B, forming to Laten, remarked

There goes a good mechanic. He is the sort of man who looks beyond the polish and tool marks on a cinemic. Though he knows perfectly well that the shuft is probably still a thely second out, he reshares that it is as services de as if it were without a couple of thousandths.

MANY time-saving shop ideas are contained in the continuation of the Better Shop Methods Department, which you will find on pages 98 to 103.



"Betcha! F' work 'r tinkering, it has 'em all beat"

"I can remember when we packed seven tools around to do what that Starrett Combination Square does. An' then they didn't do it any better. Mebbe not so good. There's a marking gage, a rule, a square, a miter, a depth gage, height gage, level and plumb, all in that combination an' each of 'em a mighty good tool by itself.

"I dunno's there's any tool I got - berrin' a hammer. an' saw - that I use any oftener. I always take it down to camp with me an' it comes in mighty handy when I'm fixing things up. An' around the house say, I wouldn't be without it. If you haven't one of 'em, go an' get one - quick. Most any hardware dealer will fix you up."

THE L. S. STARRETT CO.

World's Greatest Toolmakers Manufacturers of Hacksons Unexcelled Strel Tapes-Standard for Accuracy ATHOL, MASS.



Use Starrett Tools



### "ATKINS" It Pays to Buy Better Tools!

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INDIANAPOLIS, U.S.A.



### godesinow smoll wi

### Tired of Cross-Word Puzzles? Then Try Your Skill at These Novel Moving Letters

By ARTHUR L. SMITH

OVABLE block puzzles may be made of eight box wood, of three ply veneered stock or of other thin material. The size and method of construction may be left to the judgment, skill, and resources of the maker.

The puzzle consists simply of a shallow lack to hold a number of flat blocks, which are moved about to form various deagns. or to place them in specified positions. The depth depends upon the thickness of the blocks. The box may be fitted either with a sliding cover or a lid to hold the blocks in place when the puzzle is not in

The first puggle illustrated (Figs. 1 and is adapted from an obnomstration Puzzle" put forth by the New York World during Harrison's administration The words used are out of date, but we can substitute other words and make one like it

A box is made J. m. square inside measurement. Three of the sides should be high eranigh an that they can be grows of for a sliding essyer leav ing a depth underneath a trightly greater than the thickness of the eigar box stuff of which the blocks are nande.

THEN twentytive blocks are ent to about I in. square to fill the hose. They must not fit tagbtly. Nine of

the blocks are painted white or covered with white paper | hight of these bear the letters THE FENCE, and one is left blank. Eight of the other blocks may be red and bear the letters GARDENER. hight more are blue and bear the letters CHICKENS

Figure 1 shows the blocks as they may he placed in the first position. rave the "chickens" are in and the problem is, "How can the gurdener get them out?"

The central white block is removed, which allows any adjacent block to be shoved into the vacant space. The blocks nigst be moved one at a time in this way antil they are arranged as in Fig. 2. The blocks THE FENCE will have to be moved out of place during the process, but must be got back into the same position as they occupied before.



A variation of this puzzle can be made by using Ourty blocks in a box 5 by 0 m., aside mesogrement. In this case the blocks may all be of one color. One hears the apostrophe, twenty-six hear the letters of the alphabet, and three are left blank.

Figure 8 shows the first position. Any one of the blacks may be taken out and the blocks proved about until they are

formed into the position shown in Fig. 4. It will be noticed that thus forms the serteurs. "Froway things plemb ves d Jack Q. ' In order that the credit be given. it should be said that, this sertence. newbick each letter of the alphabet is toted only once, was evolved as a cryptogram by one known to the puzzle fraterrity as "Pho-Down '

As suggestions for other passies of this class, boxes of any size may be made

and blocks of different colors used so that they can be moved about to form various designs similar to cross-word puzzle forms. Also, blocks of different sizes may be employed so that the probless would be to move one likek of a certain size from one corner to another



The fence Fig 1) has to be moved before the jardener can these out the chickens (Fig. 2) In Figs. J and 4 is a similar peanle incorporating all letters of the alphabet

> Thus is the third in a series of articles by the Rev. Arthur L. Smith, one of the leading authorities on passles. It might be pointed out that these puzzles, unlike the "14-15" puzthe mentioned by Som Loyd in the May unue can be solved with relatively little difficulty The many readers who wrote commenting on We. Smith a article, "Solving the Famous Block Puzzle in Sexteen Ways," in March will be glad to know that several puzzles of a similar type will be described in forthcoming urner. One reader wrote, "I have made twelve of the blocks illustrated by Mr. Smith—enough to give ten methods of gesembling."

### We Home Workshop

### An Inexpensive Mattress for a Camp Cot

MATTRESS for use on a small camp. A cot may be made from squares of excelsior packing, such an are found in egg cases, and cotton batting, inclosed in a

khaki drill covering. The mattress is light and comfortable, and makes a amall roll for pack-

COTTON SOURCES OF CLOTH COVE QUILTING TIES

The stuffing is excelsion and colton batting

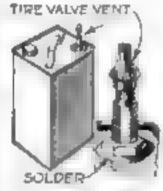
Cut the cotton balling to the length and width desired and lay squares of excelsion on top; then place another layer of cotton on top of the excelsion. Using a large needle

and twine, tie all together, just as oldtime quilts were fastened, spacing the knots alssat 8 in apart. Then make the cover and repeal the tying-together process, so that the mattress will hold stashape under any amount of hard, rough пиаде. - Ковинт D. Риквала.

### Air Vent for Gasoline Can

THE valve stem from an old muer tube makes an ideal vent for an oil or gasoline can, or any other tin container Break off the valve the longth required and then punch a hole in the can to be a smig fit for the

\*tem.



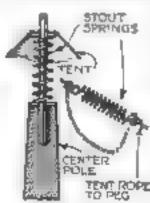
The pir vent makes the pooring essier

Insert the stem, using the not if you wish, and solder accurely in place. If a gasoline can, be sure there are no fumes in the can before soldering.

I use one such can for wood alcohol carried on eamping trips as fuel for a camp. stove. It allows the contents to be poured without spilling as so frequently happens otherwise. Eure B. Robbers.

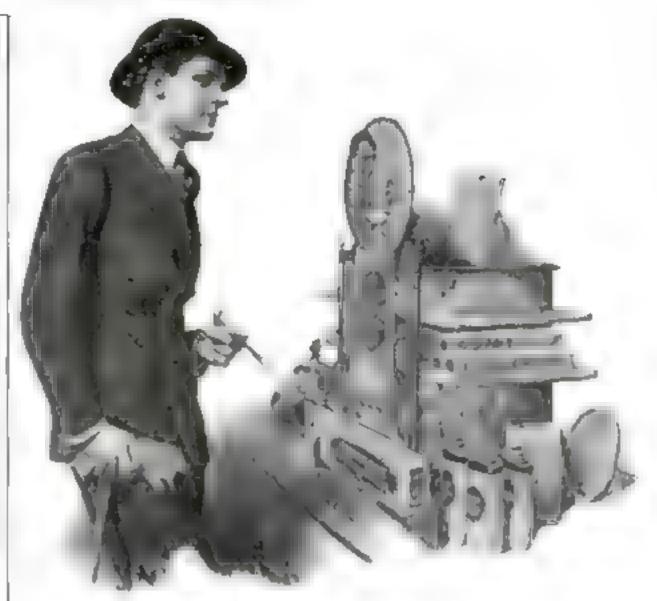
### Spring Adjustment for Tent Pole and Guy Ropes

NE of the chores of tent life is subjust-ing the guy rupes to suit atmosphere conditions. Thave done away with this by the scheme illustrated. All the ropes of



The springs take up slock in dry weather

my pyramidal army tent have collapsings from an old bed. which provide an automatic adjust ment. As an added feature. I also have an autoclutch spring on the center pole, which in my case is a 3-m. iron pape 11 it 6 m. long, standing on a base flauge. -- R D P



# Learn why

### thousands of men are flocking to this new shaving creation

Accept, please, a 10-day tube to try

GENTLEMEN -Your present sheving soup may be exactly fitted to your needs -or it may be failing in one of five inprocess ways

Shasting is so important a thing in your. life that it will pay you, we believe, to find out whether or not you are getting the stemost in a shaving cream.

80% of the users of Palmolive Shaving Cream once were wedded to rival preparations. We wen them by sending a 13day tube for trial. May we do an much for you?

#### 5 mistakes corrected

 Lother too acousty - Palmolive Shaving Cream multiplies itself in lather 150 times. A tiny bit-just one-half gram—suffices for a shave

Slow action—Palmolive Shaving Cream acts in one manute. Within that time the board absorbs 15% of water And that makes a hard board wax-like,

1. Drugs on foce. The lather of Palmolive Shaving Cream maintains its

#### THE PALMOLIVE COMPANY (Del. Corp.), CHICAGO, ILL.

To add the final rough to sharing history we have created Palmyline A or Sha ma Talk especially for man Diesn's show Leaves the same senseth and tresh and gives that well-greated hink. The the surgide we are sensing ree with the labe of Shaving Cream Phere are new delights here for every man also shapes Please for an prove them to you. Cap coupon rites 3307 creamy fullness for ten minutes on the

 Hoire lie down—That is due to: weak bubbles. Strong bubbles are essential to support the hairs for cut ing Palmolive bubbles are strong . . , they hold the burrs erect for the ruzor

5. Shin teritations—The palm and olive oil content of Palmolive Shaving Cream leaves the face in fine condition, Men like the after-effects

#### Let us prove this

We ask your permission to prove these things-to send you a tube to try. We are masters of soap making. One of our soaps-Palmoltve-leads among toilet scaps of the world. We have worked hard to excel in a Shaving Cream. We made up and tested 130 formulas before we attained our ideal

Do us the kindness to mail this coupon. for your sake and for ours-

#### SHAVES FREE and a can of Palmolive After Shaving Tale

Simply invest your name and address and mail to Dept. B-1202. The Palmythise Company (Del. Corn J. 3202 Iron Street. Chicago. III

Residence of Waternsin should address The Palm-stree Company (Wis. Corp.), Milwauker, Wa-

Print year name and address of dearly

### Fair femininity switches cigarette smoker to a pipe

It is nawnys interesting to hear high paper smokers come to discover their favorite talburen.

Lat Maher frankly admits there's a "she" in his case. And to her he gives the credit for his present pipe-scittain, etipsyclicists

Large & Rep. Co., Jillebinoud, Vin.

Concremen

I happen to be a student at the Tioyer- y of I selection, and a tire I the t started to make I have shape smaked

One on, 891F and to me. Ed. dear why dun a me a note a up. 1. I make these being strongly stronged others are eq. much more many-tooking than eight effect."

Ho, naturally I had to buy a long-stemmed plus and a car of well will all it "blubs May are tobacca". I unscalarely with a certain feeling of pride in my new lipt, I "lighted up" and proceeded to have my congre bitten. § he samest of topical I had ever heard of but non-

Sprily. I had to confess to Rh R that an R pape equator I was a good dietation.

The vine try Edgeworth of the taked, or have a short dark smaller and in solve a smaller and in solve a

For his marker in long stary short. I was forced to key ladge which input all that I had not seen a time for a life more than the language and consider the ladge was the

Yours algebraich Ld Maher a731 Hayre St. Dan Francisco.



Let its semi you free a plea of Lalgeworth spar you can built a the nine test. If ake to samples. Il tike Lagewor b e green and when--r you buy it for it er charges or qual-

> Write Your name and address la Larus & Brother Company, 108 S. 21st Street Richmond, Va.

We'll be grateful for the purie

mal as fress a vour tobacco dealer, too, if ye reare a mid thern,

Edgeworth is sold in various sizes to soit the needs and nears of all parentseers. Both Is geworth Plug Some and Bogeworth Rea by Rabbel are packed in small pocketsee packages in hamasome baradors holeing a tound and also p several bandy inbut ween access

To Retail Tobacco Merchants: If your phiber cannot aspuly you with Edgeworth, Luris & Brother Company will gladly send you prepaid by parcel post a one- or twodozen carton of any muc of Edgeworth Plug Slice or Edgeworth Ready-Rubbed for the same price you would pay the jobber.

### Monkshnow Smoll wil

### Here's the Way to Smooth a Hardwood Surface

By EMANUEL E. ERICSON, Voted Manual Training Inthority



5 Scrape the surface with the grain, but at a slight angle. Sharpen the cabinet scraper as shown in these columns in the July, 1925, usue

Note: In adjusting the amount plane, hold the sharpened from an shown in Fig. 3 above and push the cap forward trith the thumb until the cutting edge appears no water than a thread. Hold it in place with the left hand and tighten the screw



Next sandpaper with No. 1, 1/1, or 0 paper, depending upon the wood and quality of surface desired. Wrap the paper around a block and make straight strokes back and forth with the grain. Crosswise or circular strokes are certain to leave scratches that will later show through the polish

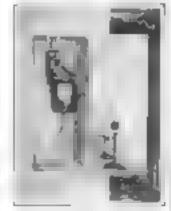
### Mr Home Workshop

### Compact Telephone Cabinet Built into Wall

THIS telephone calcast may be made by any one who is handy with tools. It consists of a hox with a wall-hoard back

that is set into the wall between two partition atuda ofter the plaster has been cut out with a cold clusel and the laths severed with a com-DRAS SEW

In this instance hoth the house mtercommunicating place and the outsale telephone are located in it No-Lee But a ledge is



The cubinet holds both house and long distance physics

provided on the made of the door to carry the telephone, and that holes are deshed in the door an order that the belt may be heard more read by "R. M. S.

### Zinc-Topped Kitchen Table

of particular from much als

had by when the table is to be moved or cleaned made.

The lower part is one large compartment for the storage of both foods and latelien attensies. It was asserabled by joining top and beltom rule ad the way around to four legs, each it in, aquare-The rails were made R in, wide and I in. thick, and all of their were grooved on one side for the panels except the two in the front of the compartment.

The tops of the legs were left extending I in above the panels. Shoulders I in deep were cut on the front and back of the legs, and the upper part of the table rests on those shoulders. Castees were provided.

The top of the table was made by as-, sembling eight mila around four leg pieces, each & in. square and 8 m. long. It was divided for three drawers, runners being supported by the lower rads at the front and back of the table.

For the top of the table, which is 30 hy , 54 m, and 2 in, thick, two thicknesses of bumber were used, one running lengthwise and the other crosswise. The upper later was placed quite smooth and naded down well. A piece of zinc was used for covering. the top. Zine is soft, and no trouble was experienced in beoching the edge is moothly The edges were tacked to the under exiges of the table with brass-headest ands.

For hardware, two pair of hinges, three drawer pulls, one cupboard turn, and an riside cupboard catch for one of the lower doors were needed. They were finished in against brass color-

The piece was finished in white enamel. but one of the new becours or a stanged and varrished finish could be used for a table of this type of preferred.

I HAVE made one of the Pirate Ship models, and it certainly is an ornament that never fails to attract attention. E. F., Mtamont, Ill.



### Friendly but Friendless

CICK at heart he watched them go. Last year he was always asked to join this merry group, but now the invitations were becoming fewer and fewer. He touched his face gingerly in miserable speculation. Could it be . . . ?

A great many young men are inclined to have a grimy-looking skin, spotted with blackheads and dull in appearance. Few realize that this funders their success in life. Pompesan Massage Cream helps you overcome this handicap by giving you a clear, ruddy complexion

Clears the Shin, Pompeian Massage Cream thoroughly cleanaes the pores. It helps clear up blackheads and pimples by stimulating healthy clr-

culation, and by keeping the skin clean and the pores open.

Easy to Use. After shaving or washing, rub it in gently Continue tubbing and it rolls out, bringing with it all the dirt and skin impurities. Result —a clean, healthy skin with clear, glowing color.



Use Pempeian Mattage Cetam regularly at home -then you Il get the full benefit. At all drugging.

### SPECIAL INTRODUCTORY OFFER 1/3 of 60c per for 10c



For 10c we send a special Trial Jar containing one third of retulat 60c conнов. Сопала вибочент Pompe to Missige Cream to test thoroughly es wonderful benefits Positively only one rar to a family on this excepcronal offer.

#### THE POMPEIAN CO., Cleveland, O., Dept 49

Gendemen 1 enclose a dime (10c for 1/2 of a 60c jur of Pompeius Massage Cream.

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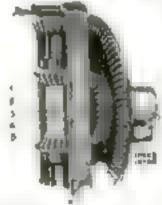


### "Yankee" Ratchet makes jobs easier

A finger touch on Marcher Shifting given any one of five adjuntmiente.

Plan Or II.

- a da hand Ratitie
- 1. Maghinshared Burnings 4 (169) 10 | Kanchet
- Record and lend



WHEN set on DOUBLE Ratchet, any movement of trank, back or forth, however elight, sends drill into work. This saves has motion and, therefore, lost time

The ave ratchet adjustments and two speeds make this Nankee Dri hands and fast

Speed changes made instantly without remov-

No. 1555 (flustrated), 1-10W. No. 555, 1-16W. Holds 35 in Drids, No. 1545, 3-jaw, No. 545, 2-jaw Holds 35 in For smaller drilling jobs use

Yankee" Ratchet Drill No. 1510, with five earther admit-

> Same other YANKEE" Tools

Banches Screwick were Ratcher Br. Heart American De of De Ha American Feed Besch De Ha Vanca, Removable Bear

Dealers everywhere WILL YANKEE" Took

food contains the utanost in quality, efficiency and decability. No Load

> Weite for FREE Mankey Tool Pools, of interest to these who love good units

North Bros. Mfg. Co., Philadelphia, U. S. A.

### Workshop Workshop

### Ways to Build a Good Float

How to Make One with Barrels That Will Last for Years

By HENRY S. LARABY

MYE members of the Bayade Canoe Club were scated on the end of their dock, basking in the sunlight of the first really warm June day of a cool and backward season.

"Well, boys," spoke up Fred Nelson, the club's commodore, "if we're going to build that swimming float, we had better take a run over to Captain Graham's and see if be has figured out a good plan for us to follow.

Captum Graham, always forchauded in things pertaining to fishing and heating,

was mending a crab net.

"Yes, I aketched out plans for two different floats," the Captain assured the eager members of the canoe club, "one to fourteen feet square (see Fig. 1) and the other ten feet (see Fig. 4).

But these neg barrel floats. said Nelson, "Why not make a plain raft"

Because a spar float, nuide up of two or more large tumbers with planks named across, is very heavy. No matter how much you paint it, the wood will souk up the water and set lower and lower each day. Barrels are easy to get, the newssary planks can be gotten in any lander. vard, and the float will set high and will not be unduly heavy. All you need to borld it are saw, bansmer brace half ouch wood bit, heavy two-meli chied and a monkey wrench.

"You will notice that the larger float has a frame which extends down below the barrels. Thus is to protect them when the float is banked out, or if it rests on the

bottom at low tide, or if it has to be heached for repairs. Without it, the nurrela might get emished or damaged mifbciently to make them leak. You can leave it off the large float or put a similar frame around the smaller float. For my part, I would put it on in every case.

"You will have to use the strongest possible construction. You will see that I have arranged the 1 mbers to make angles wherever possible—the angle from shape being about the strongest and

somplest one can have,

D1 ILD the float as near the water s B esige as possi to for case in lar i ch not. Doc de on whether you will use wooden oil barrels or steel oil druiss, but pick good ones and, of course, they must be water tight. Next order your truthers and flooring. Cit the turbers to the proper length, pair thenoup and soft them together to make wooden augles.

That will be quite a job, won Lit? asked Velson

Not if you go about it right. I would

mark each pure when ent by driving a small nad helfway in -one had in each of the first pair, two nails in the second pair, and so on. Then clamp each pair together in tarn and bore the bolt holes right through with a bull anch lot. Next cut out the time bers that are to hold the barrel. Don't bolt may together, however, until you have susked them all over with paint. Pay apeoal attention to the cads.

" After two or three. days, give them all another cont. Don't (Continued on page 81)

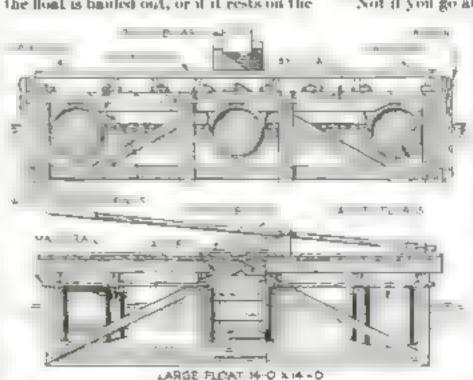


Fig. 6. Side and end views of a foot supported by nine barrels or oil drams. Note the heavy bracing framework below the water

### Workshop

### Ways to Build a Good Float

(Cost, suppl from prop. 50%

forget to run the paint well through the bult holes. This printing is very importent, and five or ten dollars' worth of paint will make your float last three years longer at the very least.

"Block up the two end timbers on blocks or a sawhorse, high enough so that you can bolt on the protecting featurework, if you decide to have it. Next bolt the two side tunbers to the ends. Now you will have a square frame and you can bolt the other timbers in place.

"Hung the barrels in their places and fasten them by means of rods, which should be threaded at each end. Point the nate threads and holts as you go along.

When the man frame is boilt boilt the protecting frame around and had on the two-by-sixes that run underpeath. They are to steady the whole and to allow the float to be rolled to the water

"Paint your flooring before cutting it in lengths. Nml it in place, but don't drave the pieces too closely together, for

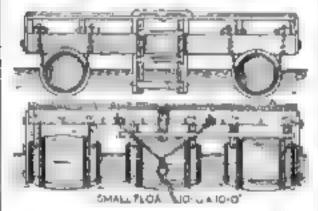


Fig. 2. A float with only six burrels. Side frames like those in Fig. I may be added

they will swell. After the mading as done. new off the waste and some the finished ends with paint. Don't forget a hundrad around the float at the top and another at the water's edge.

"The final coat of paint should be red or green below the water, but shove the water the floor should be white or a light color so as to be vauble for bosting at

You can moor the float by an anchor The stake method is the or by stakes cheapest, but it is hard to drive down the ntakes.

"To make an anchor, use a packing box about two by two by three fect as a cement mold and east in it an old brass pipe or shaft best to form a loop. You will also want to add a springboard and hadder, but that is a simple matter

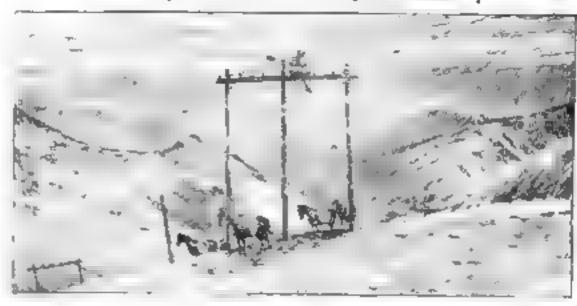
How much material shall we need: Cantain Neison asked.

I made a rough list at the time I drew the sketches, the old sailor replied. "Here it is:

The lest was as follows:

For the smaller float, 6 pieces 2 by 8 in. by 10 ft.; 10 pieces 2 by 6 in. by 10 ft., 195 sq. ft 114 by 4 in flooring, 4 pieces 1 by \$ m by 10 ft., \$ pieces \$ by 4 m by 12 ft., 2 pieces I by 3 m by 14 ft. Sixteen ! 35 by 12 m. carriage bolts, nots and washers; thirty two 42 by 9 m. carriage bolts, eight Anne Continued on page 88)

### Telephone line over the Rocky Mountains



### The Builders of the Telephone

SPARKING the country, under rivers, across prairies and over mountain ranges, the telephone builders have carried the electric wires of their communication network. Half a century ago the nation's telephone plant was a few hundred feet of wire and two crude instruments. The only builder was Thomas A. Watson, Dr. Bell's assistant.

It was a small beginning, but the work then started will never cesse. In 50 years many million miles of wire have been strung, many million telephones have

been installed, and all over the country are buildings with switchboards and the complicated apparatus for connecting each telephone with any other. The telephone's builders have been many and their lives have been rich in romantic adventure and unselfish devotion to the service.

Telephone builders are still extending and rebuilding the telephone plant. A million dollars a day are being expended in the Bell System in construction work to provide for the nation's growing needs.

### AMERICAN TELEPHONE AND TELEGRAPH COMPANY AND ASSOCIATED COMPANIES

BELL

SYSTEM

IN ITS SEMI-CENTERWIAL YEAR THE BELL SYSTEM LOOKS FORwald to continued progress in telephone communication





# The first MILLERS FALLS Electric Drill

FOR fifty years Millers Falls Company have made hand, breast, chain and bench drills.

To take up the manufacture of portable electric drills was a natural step forward. It depended on one thing—the development of an electric tool of true Millers Falls quality.

Here it is—the first number of a series. Look for it in hardware and automobile supply stores. It's a fine tool—what more can we say than that it belongs to the Millers Falls group?

### MILLERS FALLS COMPANY Millers Falls, Mass.

26 Warren Street New York

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### Godesinow smoll

### Overhauling Our Motor Boat



Mr. Brownback in a specialist in marine motors. He has provided the power plants for more of the factors amail craft plying the waters in and around New York City

OTOR BOATING is so apleteled. and invigorating a spect that boat owners invariably take a keen personal interest in the repair and maintenance of their boats. A issue may he willing to leave the upkeep of his autoentirely to a service station, but he feels his motor boat deserves that sympathetic handling and patient attention to details that no one but himself can arve-

This article is written with such an owner in mind -a man who has an average small bont. The thought of economscal procedure has been kept paramount

Before actual operations in overhanding a motor host are commenced, it is always well to make out a complete list of every item to be attended to and then to arrange these items in logical order on a newtoprepared sheet. Cross them off one by one as they are attended to. This saves time, insures a completely finished job, provides a check on any trouble that may arise, and, most of all, given wonderful peace of mod undisturbed by "Oh!-Del-I-forget-that" thoughts.

THE logical time to begin is really at the haul-out period in the fall. At that time the boat should have the underwater portions scraped, scrubbed clean and washed with fresh water before the marine growth has had a chance to harden. After that the bottom is given a coat of copper paint.

At this period the engine should be removed and stored where it can be overhauled in spare hours during the writer The operation will take from twenty five to several hundred hours if a really thorough job is to be done. It is not advisable to attempt to do it in an ordinary cellar. where working surfaces are exposed to moisture or ash dust.

Immediately upon removing the engine, take up the floor boards, clean the bilger thoroughly, and scrub out the inside of the boat. If kerosene is required in this operation, use as little as possible and By HENRY LOWE BROWNBACK

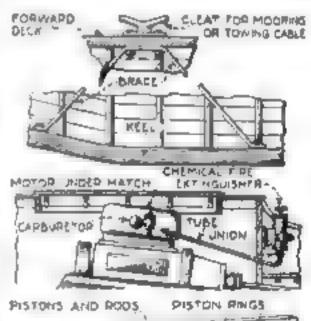
Hull Repairs

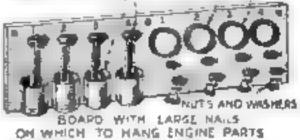
wine it out thoroughly, serubbing afterward with washing soda and water. It is a good plan to remove the old paint and give a good coat of lead paint at this

As the engine makers publish matriction books, I am not going into cetails. but will offer a few huts. First, drive into a board a series of 4-til spakes in ambered for each cylinder. Then hang the piston rougs, connecting rods, pistonic and other parts on these pins. Don't chick them helter-skelter into a liox

Clean all parts and where adjustments are provided, test carefully for wear-These adjustments can be made during the assembly but where basiance, pane and the bke are worn badly, they must be replaced. If these parts are ordered early much delay will be saved, and careful fits can be made.

If the exhaust valve stems have been sticking, to underent the top of the goode about 010 m, for Continued on page 84





POPLARY UNDERCU #IMGS **OPAIN** MOLES- . JETTLO OIL CONTROL PING A WORN SHAFT

Dences for moveling clear, a five exclugaisher installation, and other kinks for boat owners

MAKESA POOR BLARNE

### Ti Lome Workshop

### Overhauling a Motor Boat

t. antiques from page 83)

from 36 in, to % in, will generally cure it. The only other points to be cared for in the ordinary power plant are to flush out all oil mains, to test valve springs for weakness, and clean exhaust ports in twocycle motors.

In pattage in 1 ew pistons, weigh themin sets, they should not vary more than a ounce per pound. Also, see that pistoit ring ends have plenty of end clearance about ,003 per inch bore. Another point often overlooked is clearing the carbon from the under sites of piston heads. Piston prima shariff fit anaghy at the pistons. If the latter are of abuna out, they should be heated before fitting the proswhich should be from ,0015 to .002 m. larger than the holes.

Pistons that "pump" of often conand organing the underent with return

If your engire has been getting "t red " or slegged after a run of from twenty grantes to built an hoor ht a seavenger pump to draw the oil from the oil panand earry it to a tank fitted with a cooling eral From there the pressure pump should draw it and force it into the bearugs. The scavenger pump should be of nt least 50 percent greater capacity than the pressure phrap.

In all cases clean out every part of the orling system, sump, splash trays, if splash oiling is used, and drived passages in crankenalls. This is most apportant, as the life of an engine nepends entirely apon efficient listercation

In making fine lap fits, a well-known household clean ng cake with kerosene in It safe and excelle it aliesave.

After the repairs are notshed, paint the engale with some good enamel, polish the right work, and give it a cost of clear neigher, and on or grease all working ourfaces. All tag should be done at the nachagemit time.

Now we come to hull repairs. First, go over the wood with the end of a sharp jackkmie to find soft spots or rot. Tap. the wood with a hammer to discover any loose fastenings. Replace any defective wooda

THE danger point for planking is the plank running next to the keel. If the planking is in good shape, we may turn our attention to the caulking, if our boat ( is callked. If this is bad, strip out the loose cutton, run a V-shaped tool along the groove, and then recault. In order to do this properly, go to some boat yard and watch an expert. Notice how much cotton he uses, how he twists it, lays it m the groove and taps it home. After caulking, give the seams a coat of priming paint, putty smooth with white lead, and paint the entire hall with a priming

Engine beds should be examined carefully for hoose or defective fastenings and for any movement. They must be securely bolted and fastened so as to distribute vibration and load. (Continued on page 88)

### No school or home work-bench is complete without them

CARGENT Planes are tools of the master craftsmen. but so moderate in cost that they should be on every school and home work-bench. They are beautiful planes — in design, materials and finish. They are efficient in operation, simple in adjustment, so durable in construction that you may never have to replace them.

Surgent Auto-Set, the larger of the two, has an exclusive time and trouble enving feature. The cutter of edgeholding chromium steel may be removed, sharpened and replaced without changing original adjustment Back in place, the cutter is as rigid as can be, even when cutting across or against the grain or over knotty surfoces. For end work and the amaller jobs of finishing, you can't beat the Sargent Steel Block Plane. With these two planes, practically every need for finishing tools is met and professional I soking jobs are assured. At hardware stores. Write us for booklet.

### SARGENT & COMPANY, Manufacturers



### SARGENT

### PLANES

Read the Money Making Opportunities on pages 104 to 127 of this issue.

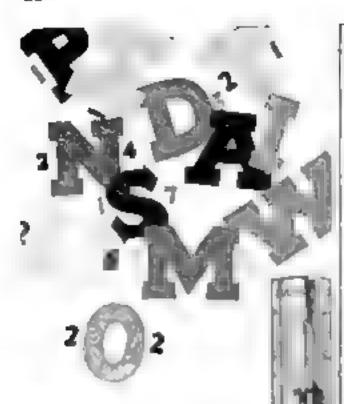


### "World's Handlest Calculator

ADDS: SUBTRACTS: MOUTIPLIES

NEW Will do the work of a large \$100 adding interibute transfer by 15 99.000 39 Total to bie as all times Tears with 15 99.000 39 Total to bie as all times Tears with 15 99.000 39 Total to bie as all times Tears with 15 every machine to the following that it if so in extracte the desire a child cap operate it the straight on a following the souther following the model with 15 the following th





School days and -Commencement is here -and workeday life is beginning, Give the graduate o gift that carries both sentiment and practicality.

Gree towething that bridger these momentous days between theory and reality, and helps translate the chance thought into sure ad-SAME MICHI

Give the gift that better than any other teaches Success frit 1. 44

PUT IT ON PAPER!

Successivaris on the man who keeps in line with his thinking those best friends of an active Brain - Breksharp AND WAHL PEN.

There's an Evertharp for yest in any style and sine yes scant This one, the popular standard gift and business model, with all tacker of lead op its sleeve, gold-flied at \$5

Perfect writing mate for Evertharp is the new Wat! Per Fracie butanceds bearinfully and lastingly made of pressens peed and referre proceedy designed to match gene Breecharp, en combenation sets, se sadrusdually " 88

### Home Worker, e

### ARCHERY-The Latest Sport

(Continued from page 69)

governs the how makers and fletchers of civilization.

What forms a most interesting and little known bit of American history is the fact that the southern Indians used charred cane or bamboo with which to make their arrow points. The charming of the cane hardened it, and with arrows pointed with this material the savages were again and again able to pierce the armor of the Spaniards, and, at least in one instance, they punted the armored leg of a Spaniard to his home's aide by sending the arrow through the armor and burying the bend in the borse's body.

The eastern Indians of olden times apparently used a much longer bow than

those made in the West Captain John Smith and his compantons found the coast Indiana using bows nearly as long as their own English long hows and quite as powerful. The arrows were tipped with chipped flakes of flint, quarte shale, or buts of hardened bone,

"HE accuracy with which the Indians could shoot with their homemade bows was quite disturbing to English, Prench and Spanish adventurers on this continent. Since their bows were better adapted to our land than the imported English hows. I see no reason why we should not model our bows after the redman's bow instead of modeling them after Robin Home's.

It is true, however, that a number of our moneers, scouts and buckskin men of the frontier did use the English long bowfor two practical reasons: the material for their arms was supplied them by the forest, and the wang of a howstrong did not attract as much attention as did the erack of a "Kaintucky Lehman or New Purcluse rifle.

In the recent war in Mexico, Villa had a whole regiment of Yaqui Indians armed with hows and arrows, who used these weapons in battle.

Catton, the artist, the Grand Duke Alexus of Russia, and Francis Parkman, all are witnesses to the truth of the story of the Indian's shooting an arrow through the body of a live buffelo so that the shaft came out on the opposite sale of

the animal and fell upon the ground When the Santa Fé Trail was first traversed by the pioneers, these hardy buckskin-clad men discovered, to their sorrow, that it oftentimes happened that their small-caliber rifles were not a match for the Indian bows, and not nearly so effective in the hunting of hig mine. While the trappers and plainamen were constantly having their rifles re-bored to the standard caliber of thirty-two balls to the pound, the Indians were increasing the strength of their bows until they averaged about a sixty-pound pull, this bow they could use handily on horseback,

In attacking a caravan, the Indian would throw masself a to a loop of braided

> hersehair on the offsale of the home and, shooting from below the neck of the horse, send his arrows with disturbsing necuracy at that activersary.

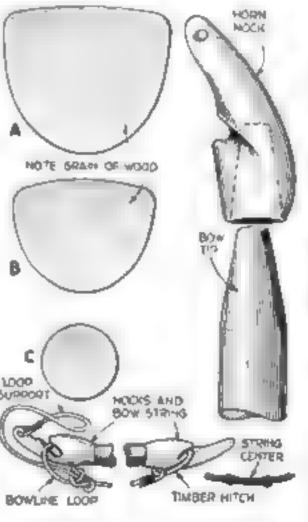
BIT THE plants trick by fighting in pars, One would draw a bead with lus long rifle on the horse an I, when the horse dropped, the other plainsman got the Indian as the latter was disengaging himself from the fades annal, It was a great game! The auswival of the fittest in animala, weapons and men.

I know of several old plainsmen, quiet, unassuming old chaps, who confewed to such an acdent admiration for the Indian bow that, when they krifed as Indian

whose how was exceptionally good, they appropriated it and carried it with a quiver full of arrows over their shoulders, relying upon it to save them powder and lead when those commodities were scarce.

Old Jim Carter told my assistant that many times he had killed an Indian with a how and arrow, much to the consternation of the Indian's companions, who, finding the body pierced with an arrow from a distant tribe, could not understand its presence.

Many varieties of word were used for bows for example, usage, luckory, ash motherry, cedar, witch hazel, walnut, and even the despised willow. Almost any springy wood can be used for a bow. particularly if it is backed and bound with (Continued on page 85) sonew. The old



Cross section of a boor at places reached A. B and C to drawing on page 69: details of thehors' nocks | knowing a cotgut bowstring

### The Home Variable

### Archery-The Latest Sport

(Continued from page 64)

plains bow, however, was made from a choice stave of usage orange or hickory, well seasoned and worked into shape so carefully, that every advantage of its grain and elasticity was considered.

As a rule, the old men of the tribe were the bow makers, and never a bow left. their hands that was not as nearly perfect as their skill and ingenuity could make it. No bow was carelessly made, not even the toy ones for chadren, some of these were minustures of the man a bow, only falling short of it in strength and length.

An Indian cared for bus bow as a white man did for his rifle, well knowing that any accident befalling it might mean hunger, starvation or the loss of his scalp and life. Usually the bow was carried unstring in a case of purither skin or heavy. buckskin, often besded and ornamented

#### The New Archery Games

.

Aucheny GOLF resembles regufrom target to target, spaced from 50 to 200 year apart. The B or 18 targets are bags of double burlap if it in diameter, stuffed with straw. A white ring 4 in, in diameter is painted in the center surrounded by a ring 3 in wase of red and an outer 5-in ring of blue. An nerow in the center scores 0, in the red, 1, and in the blue, 2. The targets are the only equipment needed to set p a course Dakland, Calif., was one of the first cities to have such a public contac-

Another game is known as too g The leader of a group of archers selects some object at a reusonable distance us a target and shoots at it followed in turn by his companions. The one whose arrow strikes closest to the center of the target then selects another target farther nway, and in this way the group tover on. Each time an archer wins the privilege of selecting a target be mores a point.

Detailed rules for regulation archery target contests, as well as for them games, can be obtained at any west equipped sporting goods store.

-----with porcuping quills. To the how case was fastened a quiver of the same matenal, of a capacity to hold about fifty arrows. War parties often carried quivers that would hold a hundred acrows. In the excitement of war and chase, the Indiana shot as empidiy as the opportunity of a int afforded

There used to be a game upon which the Ludiana gambled. Someone would bet that he could shoot the most arrows into the air, the last one leaving the bow before the first one fell to the earth. The record for this, I believe, is eight arrows. If you have an alea that this required noparticular skill, try it yourself some time, and I will admit that if you have three arrows in the air at one time you are doing "mighty" well.

Toward the latter days of the Santa Fé Trad, the western trading posts sold hickory staves, which were bought by the Indians for bows and by the white men for ramrods and (Continued on page Ra,

### NERVE STRAIN

### The Cause of Nervous Indigestion, Auto-Intoxication, Blood Poisoning

OF ALL the things that injure health, straining the nerves is more dangerous than all others combined. It weakens the nerves, paralyzes the organic forces, plays havoc with the mind; and is the cause of innumerable dangerous ailments.

#### Nervous Indigestion

Nerve strain is especially harmful to the stomach and howels, causing nervous indigestion, sluggish bowels, and kindred disorders. This, in turn, fills the blood with dangerous poisons. Why and how this occurs can be easily understood. Undigested foods in the stomach and bowels ferment and decay. This putrefaction develops gases and certain toxic poisons, just as does any putrefying matter, be it maide or outside of the body. These potsons are absorbed by the blood. which transmits them to every part of the body. This self-personing is termed Toxemia or auto-intoxication.



PAUL son BOECKMANN

A hillion Le ture Sitericani urhane il var hombe politica della propositi più della pr

#### Toxemia

Toxemia impairs the blood circulation, ensuing high or low blood pressure, doznacu, kidney trouble, mental and physicral restlessness, skeplessness, and uneasuness of the mind. It lowers the disease-resoning powers and leads to many deseases, especially golds, pheumonta, and toberculous.

l'oxic posson has the same effect internally as would a drop of acid placed on the that it, it causes pain. All bod ly pains, not due to local minry or infection, are due to turic prisons. This includes headaches, neuralgia, neur tis, theumatism, backaches, pains an the region of the heart, in the chest, etc., etc.

#### Stomach Ulceration -- Cancer

As stated, putteraction of und gusted food develops gases, which is indicated by belehing and bloating of the bowels. These gases expand the atomach like a roy balloon, causing severe pressure on the heatt and lungs, which, in melf, is often fatal. Frequent dilayon of the gromach in time develops pocket at the bottom where food remains for days to decay and develop armitating possions. This leads to local ulcers, and in many cases leads to cancer, a disease that is killing many thousands annually

#### Dieting Ineffective

Millions of people try to avoid Toxemia by abstaining from foods that readily ferment and decay. While ducting it helpful, it is, at best, but a "dodge," and not a cure. The only were his to avoiding Nervous Indigestion, and that cure must begin through the wer-

#### Do You Know-

The Is to Nerve Faces that it is not being Power and Unarrens

Place sour Verseaguerra intre-en e best) in lace intr-wride life?

That when your Verom be-every weak or a miss it and or can become not responding to weak

Plus mental in ratios especially. thin els., se note the steamers and man heart feathers on the par-ments to the steamers and the theory are unite subsequity.

Plan Nerve Heran will neach to Heat h more rapidly than any other above?

#### Do You Know -

How to develop your Kerse

How to RELAX and CALM sour bet we

Now to counteract Worry. bear the Joseph Charles along more applications.

Now to avoid Nervy Tempoh Net postation paid town at Nette Faces

Read Note Peter where all these important points are fully explained.

I write authoritatively on this achiect, as I have made a life wady of pervous people

and their ailments and weakyears I have had far over 100,000 such cases under my observation and care, of which bundleds were teated in conlaboration with leading medical so in six. No other man has had so given an experience as I in the specialty, nor but had the opportunity to test so widely the efficiency of any advance made in this science.

#### An Important Book

I have wretten a book, enwhich discusses this vival salepeet in derail and explains in number angrage how we arrain our nerves, paralyze the vival organs, and what we make do to resture them to be time cond tion. The conv of the hock prepaid is only age com or aramps. Address me, Pau von Boeckmann, Studio 164 1 0 West 40th Street, New York

This book is not a caich-penny pamphlet. It is a dignified treatise, tire from exaggeration and "bunk" Ir is on hie in many Public Libraries. Samearting Labranes, and at the National Meunal Library at Washington D. C. The book. "Nerve Force" contains 64 pages of important information and practical advice Over 1,000,000 copies have been sold in past years. Whether or not you have trouble with your nerves and stomach, you should read this book, which you may do at my risk. If it does not meet your fullest ex-pectations, your money will be refunded, plus your outlay for postage. Or, you may pay for the book after you read st.

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read of dangenous consequences.

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roll some into a putty, plug it into the old hole and screw the hook back in. Give the repair a couple of hours for the Smooth-On to harden like iron, and the book will be tighter than ever.

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### Home Workshop

### ARCHERY—The Latest Sport

(Continued from page 85)

wiping sticks. These staves were all of selected, split backery, and when fashmued into a bow were worth a good saddle horse.

The value of a good Comanche how was five horses; of a squaw, two horses. You can draw your own conclusions as to which the Comanche valued most

I do not mean a war pony just an ordinary range pony such as the Comanches stole from the Mexicans on these raiding impa to the South. A spotted war pony was equal in value to from five to ten ordinary pomes and, by the way, old Carter had to pay his father-in-law, a Compache chief, two fine was ponies and a rifle for his wife. The old Comanche thought a heap of his daughter, you see, and by the same token, so did

You who happen to have Indian-made hows, look them over carefully and if Diev are worth-while ones, wipe them or asionally with an oiled rug and give them as much care as their first owners did

I have a few Indian-made bows in their cases of beaded buckshin that I treasure most highly, and some day I hope that I may teach my grandchildren to use these same hows, even as the mondfather of prehistoric man taught his grandchildren.

There are a few white men bow users today who can do all that and more than, the Indian did with his bow

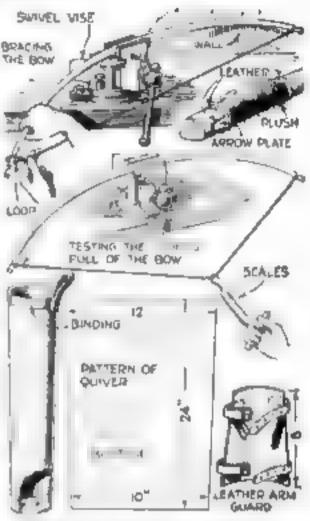
Of how woods, none is generally considered better than yew, though opiniona differ; hickory is second heat, and after them come osage orange (boss d'are), lemonwood, motherry, ash, ironwood, and witch hazel. Even willow, eedar and spruce have made good bows, though brash.

TO MAKE your own bow, get a straight well seasoned biliet of split wood, 5 or 6 ft. long and about 2 or 5 m. aquare. The long bow is notally as long as the height of its user, but I prefer one that reaches not quite up to my shoulder, as it is handler in the woods.

Mark the center of the bow stave, and from that point mark off the "hand" or handle 5 m. each side of the center. From the upper and lower marking, taper the how (with drawkinfe or plane and apokeshave) gradually loward each end, the tipof which must be a little larger than one's middle finger. Then dress the "hand" or middle of the bow to a uniform dumeter, about 134 in.

Now try the spring or elasticity with a very strong, temporary string, for the bow must bend to a pull much greater than you ultimately will want. Next look for the flat of the wood gram, and there flatten the length of the bow one third its dameter, leaving the ends round,

To do all this, use a small block plane and finish with a very sharp spokeshave, laying the bow flat on the bench, floor or table when working it. Check up care-



How to "brace" a how for testing the arr, if no uge is at hand to help you how to find dut or weigh the "pull" suggestions for making a quiver and an area guard.

fully by measuring both tapering sides to keep them equal throughout.

The round of the bow is called the "belly," and naturally curves or bends in: the flat part is called the "back," and is outside or away from the string. Bap or back wood should be the back,

Horn tips are not imperative, but are the usual end of shop or trade bows, and make a good finish. Tips are usually made 3 in long, of cow horn which has been sonced in warm water until the born can be easily alsoped and "mocked" with a packingle and round file. A hole 1 1/4 in. deep is bored in the butt end with a 🗽 in twist drill (not a bit for word). The hole is all ghtly enlarged at the opening, graduating to its end

Shape how at ends or tips so as to receive the horn tips anually. Dip the tips: in warm water let dry partly, then paint the maste with strong glue, also the bow end, fit hora tip on carefully, its curve being toward flat or back of bow. Wipe off superfluous give and set ande for several days. The notches or 'nocks' for the howstring should be carried on horn tips 2 m. from the end before they are gland

The next step is to arrape the how carefully with a cabinet scraper or a meceof broken glass and rub it with sandpaper renoving all irregularities and getting the how reduced to equal curve or spring (nearly a true are) and the desired "pounds pull." But, should (Continued on page 87)

### Me Home Workshop

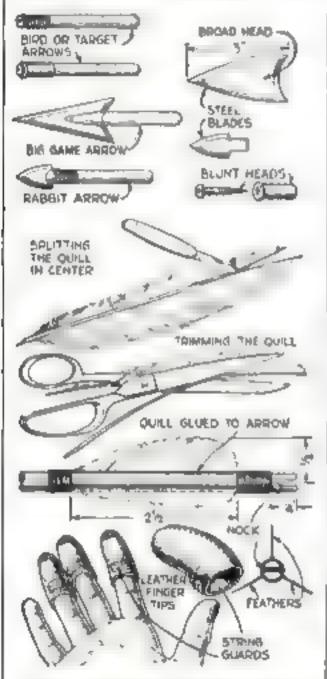
### Archery—The Latest Sport

(Continued from page St)

there he a hend in the gram of the wood, don't try to straighten it, it cannot be done without weakening the bow, and the only harm the bend does is to spoil the symmetry of the bow

Now glue around the bow, at its middle or "hand, 'a piece of tan or brown velvet 0 m. long. The preeting sides should be on the back of the how and the ends overlapped by streps of leather gloed on.

Carefully oil the bow (protecting the velvet) with warm imseed oil, a little at a time. After two applications of oil, set



Various arrow points, how to trim end attach feathern; one type of leather fager tipe

the bow away for a week laying it flat on the floor to avoid warping. Then varrash or shellae in a warm room or in the numbrane. Let the varueh dry thoroughly and rub down to a dell, polished surface with rotten stone and oil. Reep the velvet well covered until the bow is firished.

The "pull " "pounds pull " or " weight" of a bow k the number of pounds in pulling strength needed to pull the fullsize arrow to its head. The English archer's bow was from surty to eighty pounds pull. Indian bown forty to sixty Arthur Young's how is eighty pounds.

The next step is to make a howstying. though personally I prefer to use a heavy hass violin cord of catgut. But a fine bowstring can be (t outsided on page 49)

### "If...

FREQUENTLY you hear a man say, "If Fatimas were sold at fifteen cents everybody would smoke them." No doubt, but that's easier said than done. For without the finer tobaccos, the subtle delicacy, made possible by a few cents more. Farima would not be Fatima.



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### Me Home Workshop

### Overhauling Our Motor Boat

f putinued from page 83)

Now, let us go over the secondary mechanical equipment. Check up rudder cables, the steering gear and the pulleys, and remember upon assembly that everything which moves or rubs should be labeleated. If a part is hard to get at, oil well and smear with graphite grease.

Examine carefully the rudder and rudder shaft for corrosion. Just because both are of bronze means little, as severe electrolytic action can occur between two varieties of bronze.

Take of your propeller and lay it on a fint surface. Then, make a templet of the space between one blade and the surface and check each blade with this for pitch. If bent, straighten cold.

If the shaft is cut in the bearings, replace it. If there is quite a length of shaft in the boat, it can be moved aft and two couplings used inside, with a length of shaft put in to make up for the movement. Of course, the portion of shaft moved back will have to be cut off and the shaft re-machined for the propeller.

At this time the bearings in the strut should be examined and renewed if worn. Do not fit the shaft too tightly in this bearing, as there must be about 1002 in space for a flux of labricant. I have often thought that a graphite inlay for the bearing at this point would be a good thing.

Return the propeller shaft to its position replace the packing in the shaft log, and put in plenty of graphite. If the shaft log is a long tube with an inside bearing and a shifting box, load the tube up with grease; if it is of the inside stuffing box type, drill and tap the bearing back of the stuffing box for a pressure fitting and then put a tube and "gun" on it for a grease cup, and give the handle a twist every day. Every bearing must be lighteated, and if this isn't done with oil or grease, it will be done by water seepage in the form of a "leak."

Examine your mooring deck cleat and towing cleat fastenings. If these merely bolt to a deck frame, they can be made a lot safer by running steel or bronze straps from the bolts to the keel or hull frames as ties.

Oo over the fuel lines, water lines, and electric wiring, and replace as necessary Look over the exhaust pipe thorough a Many mysterious leaks originate in leaky exhaust pipes.

Give the inside of the hull a second coat of paint and put back the parts as taken out, but in reverse order. Do not, however, couple up the propeller shaft as noth out of water are always distorted Engines should be "fined up with the hull in the water

AFTER the engine is in—(by the way, if you have pressure fact feed you might replace it with one of the little electric feeders now available:—we can finish up one external paint job. The value of our fall cleaning up and printing coat is now apparent, as instead of a disagrees de scraping and burning job, we have now but to sandpaper off the job and put on our finishing coats of paint.

Now that the boat is pointed fined the details. These seem easier after launching, but are not. Put the boat in the water and after she has "soaked up," carefully alone the propeller shaft coupling.

This seems like a lot of work, but is really simple and will save much trouble during the boating season.

### Sandpaper Block for Delicate Work

POR sandpapering delicate work, small moldings, and the more intricate parts of homemade furniture, the amateur woodworker will find that a sandpaper block of the type shows in useful.

A block of this size is intended for use with a quarter sheet of 0 by 11 in, sandpaper. If the make of sand-



paper van use a smaller, the dimensions may have to be scaled down a triffe, as the quarter sheet must hap around far enough so that the central block will hold the ends securely when it is pressed into place. The rounded edge is useful for smoothing shaped pieces the angular edge for getting into close corners. R. S.

#### Ways to Build a Good Float

(Continued from page St.

B in, carrage bolts; four ¼ by 5 in, carrage bolts; sixteen ½ m, round rods cut to sut and threaded at both ends, with nuts and washers; about 800 twenty-penny galvanized nada for flooring; four ½ in, eyebolts; tar for barrels, and paint for woodwork.

For the framework of a larger float: 4 pieces 2 by 3 m, by 14 ft.; 8 pieces 2 by 4 m, by 8 ft.; 16 pieces 2 by 4 m, by 14 ft., 18 pieces 2 by 6 m. by 14 ft., 6 pieces 2 by 8 m. by 14 ft; 4 pieces 1 by 4 m. by 14 ft., and sufficient additional 2 by 6 planks to cut 16 pieces 40 m. long and 10 pieces 50 inches long.

#### Likes Our Blueprints

I COMPLETED the Pirate Ship model with the aid of your blueprints, and was really astonished. Your blueprints are wonderfully made and it is a pleasure to work with them.—O. M., Pullman, Wash.

### The Meine Workshop

### Archery—The Latest Sport

(Continued from page 57)

made of twisted linen or silk thread. A heavy carpet thread will do, twelve or axteen strands of it twisted upon stself, then wet, stretched, dried and waxed with shoemaker's wax.

At the loop ends and at the center, whip the string with silk to prevent direct contact and wear. The "whipping or wrapping to receive the arrow nock should be about 3 in, wide and only thick enough to prevent nock chaic.

Never keep a how strung when not in use. Five mekes from atring to bow belly is enough space when the bow is strung.

A thick leather guard on the left wost is almost imperative, as a swat from a bowstring is no "chicken's peck."

For arrows, select straight, well seasoned he or Ag in, dowels parchasable at a hardware store, humber null or joiner's shop. These are asualty brech, although often called maple dowels. Cut to half the length of the how. Make the nock ½ in, deep and about ½ in, or less water. so that the cord fits song, but not tight.

To feather the arrows, pull off the outer mulrib of the broad side of a turkey or goose feather with the feathered part or plunte adhering. Glue three strips of feather equally distant spart around the arrow, one feather being placed exactly at right angles to the nock. With fine thread temporardy wrapped around the midrib. keep all in place while the glue sets. When the give is dry, wrap with alk thread the midule ends. The ends of the thread must be tucked under the weapping no knots.

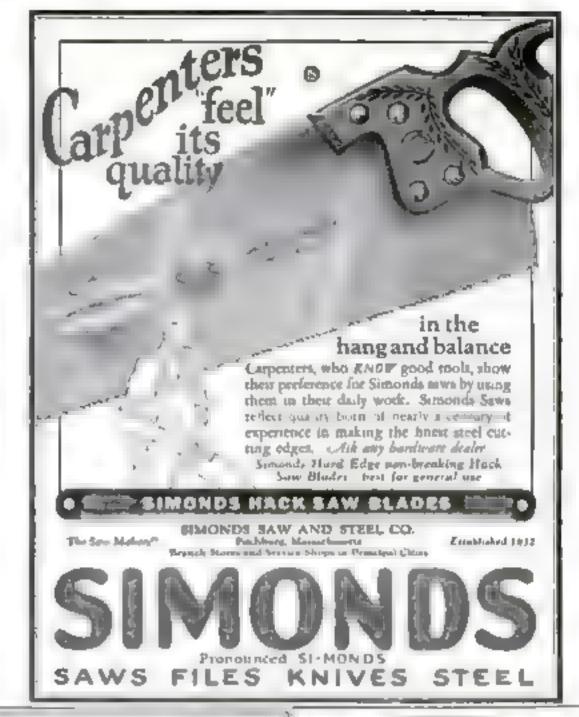
PAINT colored rings or bands around the arrow in front of the feathers as an dentification mark. Every Indian defthus, and the first mortal wound shot in game was the point of ownership to the animal or its best parts. The entire arrow should be carefully varnished or shellacked and subbed down with oil and rotten stone.

Empty 34, 38 and 41 cartridge shells fitted to an arrow make excellent bracks for target shooting. Other arrow points are illustrated.

If you make your own arrow shafts. use split bickory. Place in a straight. grooved board and with a sharp, small block plane, work the strip down to 38 m in diameter, perfectly round, as gaged through a ring or bole (as in a steel dowel plate) of that size. Coarse and fine sandpaper will give it the final finish, ready for feathers and nocking.

If one thooks a bow and arrow is a child's toy, read the explosts of Sexton Pope and Arthur Young with their selfninde bowe and arrows. Turkey, deer, elk, moose, bear and even hous were killed by their weapons and skill.

So, after all, there are a few today who still cling to man's prehistoric weapon the origin of which is clouded in legendand conjecture; and these few are as skilful as those archem who won the battles of Hastings, Créey, and Agmeourt, and those who shot arrows through buffaloes.





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### Home Workshop

### We Build a Woodcraft Cabin

each end. The 20-ft, rulge-pole was carried on short posts resting on the end stringers. A 20-ft, purlin on each aide divided the space between ridge and side

On this roof framework we nailed 8-ft. slahe, round aids up, letting them project a foot for caves. Over these we went with axe and hatchet, cutting off bumps or knots that might injure the paper.

Then we tacked on the roof paper, carefully pressing it down in the dips between the round sales of the slabs. Tar. was applied plentifully, not only on rulger and over joints, but in large erratic patches and strenks. A pot of white paint was thinned with off and splashed over the roof with a broom. Then, while tar and paint were wet. I pelted the whole

most. This stuck on the soft point and tur, and wholly cleared away the horrible shop-made look of the roof.

surface with and, clay, and

For walls I had decaded on slabs. with the bark on, because they were at hand. Wooderaft as "What you have, where you are, right now ' Under source e greumstances | 1 might have used logs, but they would have greatly increased the labor

WE discussed the advisability of using oak pegs instead of name to fasten on the slabs, so as to proke it a wholly wildwood cabin. But this would have entailed making a hole for each peg, and

considerably udded to the work.

When it came to the door I made that of slabs, duly slatted together, and added an angle brace. Wooderaft hinges were decided on.

About this time a local curpenter, out of a job, came around to ask if we needed help. On being told, "No," he sat down on a near log to amoke and express his otter englempt for our crisic, quick, and handy woodwork. His scorn mounted ever higher as I set about the wooden hinges. He wondered why I did not go to the hardware store and get a real good pair for a quarter.

But I went calmly on. I cut a young brekory slat for the top, and bored an upand-down bole through this. Then I whittled a strong hickory fork so it was a right angle, with one leg 3 m. long and the other 1 ft. An auger hole in the post

received the long leg. The other went through the long wooden strap which, when nailed on the door, made the upper

The lower was a beckery slat nailed as shown, with a projecting pair, I am thick, which was received in a hole bored in the

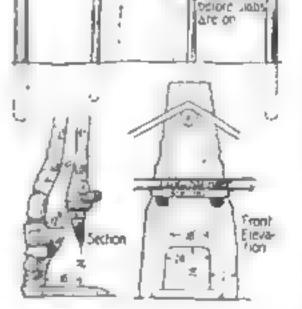
log doorsell.

-evation

As I drave in the last pail that fixed this and gave the door its trial swing outward, the Carolina curpents; spat out. his quid, as he ejaculated: "Hell, it works!"—then he wasked off to bother use no more. In that ample exclamation, I found ample offset to the scorn of the whole day. It was his acknowledgment of my victory—rather, the victory of our erude handswork over the hurdware store!

> Now I had the latch to consider I could have gone to the village store and got a passable thumb latch for

twenty-five cents, which would have worked so far as latching the door was concerned. But I was test it woodsy, quant, bothemade. And also I w shed to emist the magne of the old phrase, 'the latch siming is ont for you,



The framework at the freplace end and views showing details of the freplace constructs in

S0, of hickory I with a kreper, and in the door souls placed a hook. Then, through a oad hore. enlarged by mong a red-bot nail, I pushed a leather thong, fastened one end to the crossbar, acht woold lift when polied, and the old proneer latch was complete. By deaw-

ing the string in at night, the locking of the door was effected. By leaving it out, it was made plain that we were 'receiv-

The windows were nothing but square openings. But we made slab shutters, which hing by canvas strips from the top outside, and could be eksed with a button at the bottom.

For the floor we merely leveled, watered, aixl hammered the clay

We finished up our cabin by making eight bunks of hickory rods, four up and

This took us a little more than three days. But no calue is complete and really a happy spot without a fireplace. Stone was abundant, sand was cheap, and cement available at a dollar a bag.

We borrowed a couple of trowels, and in one day more (finitioned on page 91).

### godezigow smoli w

### Rope Sling Aids in Climbing Tall Radio Mast

WHEN the rigging on your radio mast or flag pole breaks and repairs are needed at the top of the pole, the only solution often is to climb the pole or take it down.

Not everyone is an accomplished pole climber, and even if you can climb, it is rather difficult to do any effective work

> Posteoing up serial wire at top of poin



at the top, such as unfouling the tackle or running a line through the block

By using a most rope sling as shown in the accompanying its istration, the task of combing the pole and working at the top is made in ich eisner. The sing is wrapped around the pole and one end passed through the bight and drawn up,

When ready to start the chinb, pass one leg through the free leght and chinh to the usual way. The sling will move along as you progress. A rest may be taken at any time and the weight of the body brought to bear on the song, which will tighten up and grip the pole. - H.W.

#### We Build a Woodcraft Cabin

thankinged from page 301

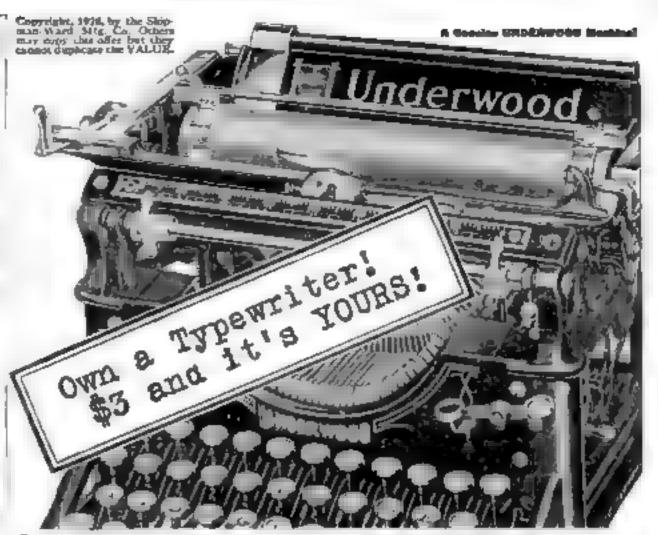
made a tary but satisfactory open firepaice at the end opposite the door.

Now our cabin was truly finished, and we celebrated with that throlling consecrating ceremony called the "lighting of first fire.

That night we slept in the blocks. It was cold, but the place was steeped in the sweet, hosy odors of the forest. We left the joy of complete success. And as we sat late about the blazing cracking fire, we experienced some of the best feelings. that belong to the far past epochs feelings which rarely enter the lives of those whose aution of home is a poished, rug-strewn floor, and whose joy and comfort are symbolized in a steam radiator

The calculation there yet unharmed by the storms of mx years. The tents near-by have rotted away

But the Wooderaft Cahin stands today not only in the Blue Ridge, near the great assembly hall and camp, but in a hundred other parts of the country. For every year it is seen by thousands. Those who are ready for it get the message, and carry plans and kiess away to realize them in their own camps, in every remotest part of the land.



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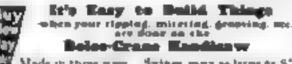


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What Could You Do with \$50? See the Cash Prim Offer on Page 4.

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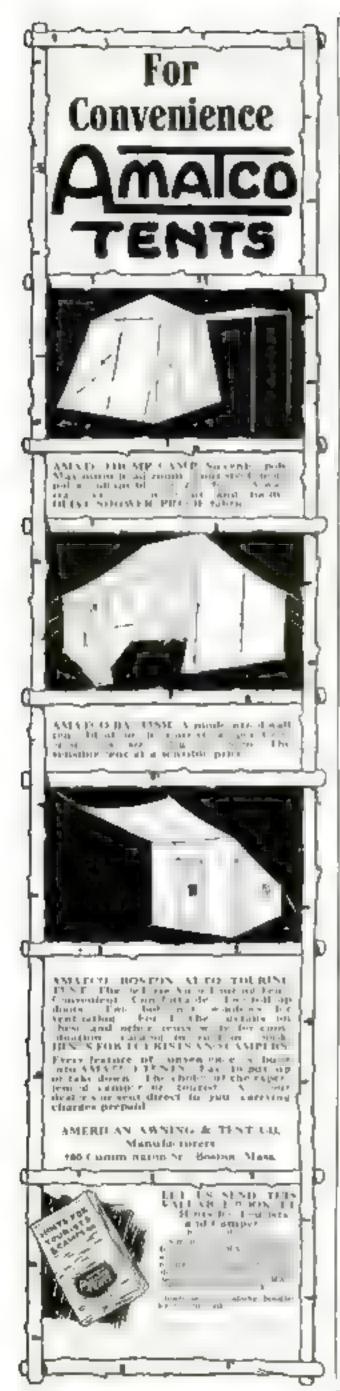
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SEND NO MONEY dark thin rounder inder

The cornered figures offers a legislation in the control of the co



March 19 Ste



### Morkshop Workshop

### A Yacht Model for Racing

(fontinued from page 76)

which is waterproof. It is a white powder and should be mixed with cold water to the consistency of cream, at least half an hour before use. For exacting work like this, it should be used the day it is mixed. It is obtainable at model shops, from casein glue manufacturers, three-ply makers, and possibly elsewhere. Once it is set, water has no effect on it. If other glues are used, all joints must be shellacked or otherwise protected from damp, this applies particularly to the made of the joints.

When the glue is dry, shape the hull with closel, plane, spokeshave, kinfe or what you will, to the profiles shown in large, 3 and 6. Note that seven processestions of one half of the hull are slown. These represent the shape of the hull at the stern and at an other places indicated in Fig. 3 by the station loses I-VI. These lines are spaced 3 on apart, the deck pain being 21 or long over all. The buttom of the hull for about 11 m,, where the keel is to come, must have a flat surface about 45 m, wide.

Cardboard templets may be made of the seven section lines, and the wood shaved away until they fit on. It is, however, more important that both sides are made alike in shape and thickness than that the lines are preserved exactly as given. Small deviations from the design will do no harm.

HAVING given the block a final shavting, accuping and sandjupering, seribe a line all around the outside is infrom the top. Cut in along this line to form a subbet or recess is in, deep at the how. This tapers to nothing anudshaps, as will be seen by studying the sections shown in Fig. 3.

Out away the mode until the hull is about \$4 in thick if you feel equal to the task, but do not cut too bue at the top; leave \$4 in, at the coges, and plenty of wood at the how and stern.

It is hardly necessary to add that there pieces of  $\gamma_i$  in, thick would may be glied up for the block A, is which case proceed just as if one solid block had been used and do all of the cutting after the stock has been glied.





Pig. 4. The yarbt on a tele) spin in Central Pack New York, Fig. 5. Under view of hull

To make and fix stem E, use a piece of cedar or other semi-hardwood  $\hat{\tau}_h + \sqrt{1}$  live 2 in. The shape of this is deficult to describe but can be seen in Figs 2 and 3. It fits in the fore end of block A. It is best fastened in place by borning a  $\hat{\chi}$  on hote right through it is to A and mostring and going a dowel. Dowel stocks may be obtained at any bardware store.

The stern board C, \$5, \$4 or \$5 by 1 by \$4\$ in , should be of similar wood. It is glied and analed from underneath, and a couple of nada are toe-naded in from above inside,

Two temporary molds D, as indicated in Fig. 7, of any wood, are lightly nailed in position from underseath through the

hull. The large one is placed about 8 in from the stern and the smaller. 6 in from it, but before fixing them move them along and I their edges corneide with the edges of the hull.

For the side planks B. use two pieces: I straight-grained wood % by 2% by 2% in. These can be of soft pine, but cedar or mahogany, when variatished, makes a more altractive appearance.

Continued on page 9d

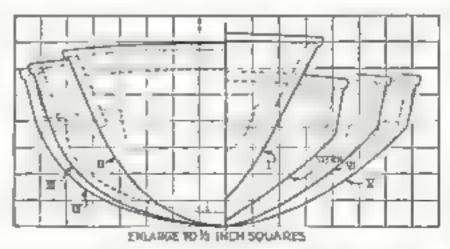


Fig. 6. To sid in shaping the hull correctly, it is well to make seven confluent templets by calarging these section lines.

### We Home Workshop

### A Racing Yacht Model

(Continued from page 84)

Make cardboard pieces first, stretch them along and see that they fit, getting them to come anugly together at the bow and leave a slight overlap at the stern. Do this on both sides. It will be noted that they lie in the rabbet at the fore end. Then cut out the wooden strips.

The fore end of these pieces will need steaming or boiling before being bent into shape. They can be put in a bucket of boiling water for twenty minutes, then bent rather more than the final shape and thus fixed until dry Lay them in position. and lightly und to the molds, seeing that you have a very next fit at the stem. Remove them, glue them, and clamp near the now. Neal them to the stem and all the way along, working aft toward the stern board. Keep the nads well up from the edge and point them down into the hull. The thunsest obtainable 16-16. braids are best. Brass sails do not hold well. I so a small twist drill or fine bradawl to make the necessary holes. The deck beams F. Figs. 2 and 5.

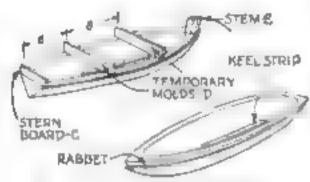


Fig. 7. After block A to shaped the stern board, stem, kvel strip and mulda are edded

which are cut from a strip 😘 in square. an eross-section, now should be put in position. The short one in 434 m. from the stem, and the honger, 614 m. from the ontaile of the stern. Do not out the ends until the pieces have been placed across the aide planks and the edge bevels marked. Note that they use is the center, 34 for the shorter one and 34 in for the longer one, this is called the camber and both makes the deck stronger and insures the water a running off

Glue and mad the beaution in position and remove the temporary molds. Plane the top edges of the sade planks so that both sides are exactly alike in height and slightly chamfered toward the outside.

Beyel the lower edges of the ade planks to the slope of the hud at the after end. and the hall to the edges of the planks at the forward end, so that the whole length is one smooth curve.

Along the bottom of the boat made. give a strip of wood about 16 by 15 m. in cross-section to take the acrews that will hold the keel in position.

At this point, before inclosing the hull, give the made a good sousing with warm buseed oil.

The hoat is now ready for the deck. G This had best be a piece of \$1 in. thick three-ply wood 8 by 21 m. mahogany for preference. Lay it in position, mark it underpeath, (Continued on page 94)



### 2c STAMP

will start you un the read to success. See Money Making Opportunities on pages 186 to 127.



For Outdoor Time an naersolt



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Stands the bumps of outdoor one better than higher priced, delicate watches. Tells time up the dark. \$4.50

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### C.O.L. (S. M. C.O.)

### We Add Another to Our Ship Model Blueprints

TOW that we have a reen those of our renders interested in making decorative shipnumbels two sets of blueprints with which to work, we have prepared drawings to aid those who wish to build the type of amp model that will really said.

These drawings are incorporated in Blueprint No. 48 in the list below. They show the full-mae hull and the

details of the 20-in, racing model illisttrated at the right. Other views of this remarkably speedy model will be found on pages 70 and 9t in connection with Captain McCann's article, "A Yacht Model for Racing.

### A Racing Yacht Model

of a discount of the property

and cut to shape. Gine a piece of the same or other thin wood about \$12 m. on sare on st, centered about I in, from the stora. Through this and the deck cut a hole about 114 in, square for the hatch. Now glue and had the deek to the side planks and ends.

A light molding along the top edge. H. cailed a sheer-mold, below this joint, and if made of wood of a contrasting color adds to the appearance. It should be about 3m in wide and 3m in. thick and go right around, glue and sail it lightly.

A HATCH over Javneeded to fit mand on the opening. It is made from two pieces of wood or, better a piece of wood for the top and a piece of cork to fit in the opening

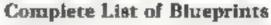
Only well seasoned wood should be used throughout. Such anall pieces as are preded can often be found on the lumberyned or eurpenter shop junk beap.

Most of the cutting and finishing operotions described can be done most handily by holding the model between one . knees. The hall in fruil until completed. and any kind of vise is likely to crush it.

Fill any cracks and nathead holes with white lead tinted brown, if the top is to be finished in a natural color. Give the lower part, as far as the water line, two or three coats of light gray paint, and the upper the same number of costs of clear spar varnish. Rub down between each, and stand by to make the spars, sail, keel, and Fleering gear next mouth.

#### Making Small Wheels Quickly

N ADJUSTABLE washer cutter de-A signed for use in a hand brace can be used for making wheels for toys. Solid disks are cut from sole leather or fiber such as is used for gaskets and washers around steam fittings. Flanged wheels to replace those on toy trains can be made



ANY ONE of the blueprints listed below can be obtained from POPULAR SCIENCE MONTHLY for \$5 cents. The Editor will be glad to answer any specific questions relative to tools, material, or equipment. Blueprist Service Dept.

Popular Science Monthly 250 Fourth Avenue, New York GENTLEMEN.

send me the blueprint, or blueprints, I have underlined below, for which I raclose ... cents

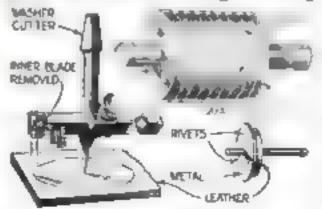
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by riveting a thenner and larger metal disk to each wheel.

(Please prot name and address very clearly

t ty and State

Small pulleys for motors can be formed by cutting a number of washers from bravy material and riveting or bolting



A washer cutter serves for cutting the disks, which can be used singly or an combination

them together. If the holes to fit the shaft are cut to a driving fit and the washers driven into the shaft one by one, they will, when bolted together, grip the shaft very firmly. REUSEN JERKEN.



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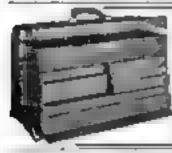
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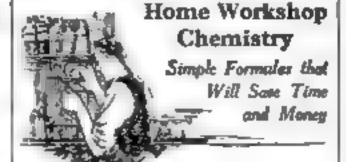
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Auther to place with complete instructions and historic de-table for the consequence of the most important aligns. American history SASTA MARIA will be sent inportant of SASTA THE KARAK COMPANT Dept. C. Links Neck L. I.

What Could You Do With \$50—? See the Cash Prize Offer on Page 4



WATER GLASS is one of the chemreals that should be on hand in every home workshop. It can be obtained at any drug store. It is used universally as a preservative for eggs, but to the worker with tools and chemicals its greatest value lies in its fireproofing and cementing capacity.

Water glass is a thick, viscous, syrupy water-white liquid. It should always be tightly stoppered with a cork. Never use a glass stopper, as it will become tightly

cemented to the neck.

When water glass is much with lime or cement, a double silicate is formed that is resistant to all types of activity. Wooden workbenches brushed with dilute water glass and then with a solution of time or



Applying a cement of water gless and preespitated chalk to the edges of a piece of glass

cement, held in suspension in water, soon dry to a hard, almost stonetike surface. This will resist heat and the activity of almost all types of chemicals.

It also gives us one of the heat types of cement for uniting porcelaus and glass. The water glass should be mixed with precipitated chalk to form a very thick masa, which should be well attreed with a piece of wood as rapidly as possible. The entire mass becomes hard within thirty minutes. After it has been mixed, the cement is applied and the preves are tightly pressed together and tied or clamped. The cement that exides must be removed before it becomes hard.

For your convenience, the following label has been prepared. It is intended to be cut out and pasted on your bottle of water glass or filed among your formulas.

#### Water Glass

(Sodium Silicate) Na. Si O.

Resp tightly maked the not use glass stopper. For freprioring a sed, brush no dilute solution of water glass is water and then cost with rement or time suspended a water

time suspenses a water

As a remept for agenting glass and populate, test

anter glass with presipitated deals and apply quarkly
to the object. The comes will agitational the armost
of water, acid, alkali and alcohol. The expect may
be colored black with automosy triodiplacie, greenish
black with grounding, green with sine dust, dark given
with chromoside, blue with color thise grange with
red lead, bright red with mercures sulphide.

This is the first of a collection of handy reference labels to be published in the Home Workshop Chemistry column.

### Running Ahead? or Just Running

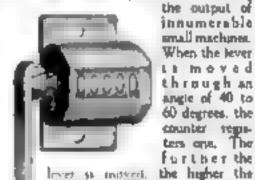
Machines just run without thought of running ahead. But see their records on Veeder Counters, and you see the room for improvement!

You promptly see the improvement register, by closer watch of the operating.

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This small Rotary Retchet Counter (No. 6) counts reciprocating movements of the layer, as required for recording



the output of innumerable amail machines. When the lever LI moved through an angle of 40 to 60 degrees, the counter regu-ters one. The further the

name set legal eard. A complete revolution of the lover registers. ten. This counter can be adapted to no end of counting purposes, by regu-

lating the throw of the lever. Price \$2.00. (Cut nearly full stre.) Small Recolution Counter, also \$2.00,

The Set-Back Rotary Ratchet Counter below as for machines such 46 present and meta-stamping machines. where a reciprocaling movement tachcates as operation.



Regulers one for each throw of the lever and sets back to sero from any fasure by turning lenob once round. Supplied with from four to ten figure-wheels, as required. Price with four figures as illustrated \$11.50 subject to discount. Out less than 1 g size.) Set-back Revolution Counter of similar model, \$10.00 (list).

Write us about that counting problem of yours—ar see how it's solved in the big Vooder booklet; copy free.

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### CHAS, FRESHMAN CO., Inc.



# The Shipshape

# This Painting Kit Saves Time



Colors and brushes ner niways at head

BRUSHES HANDLE 7 x6 xa SASH BLACK

The can in divided into four sections

FOR those who do their love house painting or even a limited amount of it. the paint kit illustrated is worth many times what it costs to make one, or in deed, to have a kit made.

The pail is divided so that two or three colors may be applied without getting down from the holder. It is much more convenient in every way than the old atyle of pail with a hook.

With a tiu sings and soldering outfit it. can be constructed with little difficulty in any home workshop.

When the wires are bent to give the proper tension, the pail sets firmly against

the aide of the ladder, always ready for the brush. The bail does not interfere with the ladder rung. Incidentally, the britsh is more easily dopped into a square opening than in the usual round pail, and the mephas point may be wiped off against a straight nide more even y.

if placed on a fint surface, the pail is not apt to be tipped over it will even stay on a moderately

National and Lond.

The langing wire is made of heavy wire, such as No. 10 gage, so that it will not bend while in use. There should be extensitraps or reinforcing pieces riveted on the container where the wires are attached. In the pail shown, the upper hanging wire is a continuation of the wire that forms the upper rim. If deared, a tight fitting cover may be added, but the nuther in actual work found there was little use for a lid. W. W. WHITE.

A Radiator Shelf

IN MOST homes nowadays, some use is usually made of the space

occupied by certain radiators to supply an extra shelf. hometimes the radiator is



Two saddles made as shown at the right support a board, which serves as the shelf

inclused in an claborate grill, often a simple board is placed on top.

To get a board into stable equilibrium, especially if the top of the radiator is at all rounded, is not always easy. The accompanying illustration above an effective method.

Two saddles are made with vertical legs just thick enough to fit saugly between the cuits of the radiator and long enough to allow the cross strip to project slightly above the curved top of the rathator. Stout wood screws fasten the parts together

The saddles are set astride the radiator two or three cods from each end if the radiator is of average width, and the board for the abelf is rested on them. A facing piece may be used, if denred, to give a final to the front of the shelf.—H. J.

Furniture Protectors

MANY PIECES of furniture have projecting handles, arms or corners,

which usually get battered or sometimes broken in ordinary usage. These may be guarded by cutting simple protectors from old muce tubes which have been slit open, washed and flattened out. The actual covering protects the edges or corners in one direction; and the overlung protects them from the other direction.

The ones illustrated were used over the two outside arms of a tea wagon handle (Continued on page 97) They were beld



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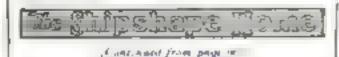
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\$100 IN CASH PRIZES

See Cash Prize Offer on Page 4 in front advertising section.



around the handle with a long, merow rabber band The ten wagon is of mahegany, and the dark red tube almost matches it in color, at least it is not offensively different, even ser this year integrated of furniture.

These protectors have found use on doll car-



How the protecter is cut out and epolied

riage bandles, and on other love, on extended arms of clears, long pointed rockers, and in neveral other places around the home. - Morris A. Halla

Painting Floors Easily

IT is no joke to luve to shellur, varnish, paint or beguer the floor of

a large room on your hands and knees. If a clubb a play car of one of the smaller unneties is at hand, it will be found to serve as a convenient seat for work of this kind, -J. D. G.



In poloting a floor tirement inceling may be avoided by nitting on a child's ploy car

### Preparing Whitewash

IN KEEPING the cellar shed and barn shipshape. and also in pro-

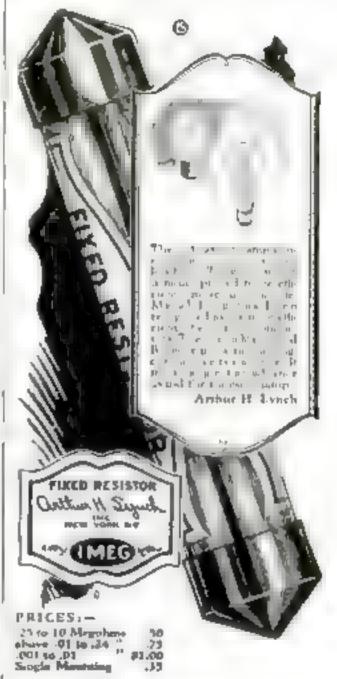
tecting trees against worms and insert posts, whitewash is as valuable as it is inexpensive.

For exterior use, such as on fences and sheds, dusolve 15 pointeds of common soft in about 734 gallons of water, add one 50-pound sack of hydrated inne, or the putty made by slaking by husbel of fresh quicklime in water, mix until a smooth paste is formed, and then thin with water as necessary.

When the whitewash is to be used for interior work, a paste made as before should have a solution of 3 pounds of git c in about 2 gallons of water added to it. The mexture should be sterred thoroughly and then thinned to the desired consist. eney. One quart of crude carbobe and may be added to either of the mustures as a disufectant.

The surfaces should be cleaned and evenly dampened immediately before the whitewash is applied, to insure against chalkiness or flaking.

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### Better Shop Methods

### Old Bill Says

**\*OOLS** are extra hands and fingers, even though we call them lathes, planers, squares, or calipers.

Every good mechanic is presumed to know the importance of accuracy.

A lot of us make the mistake of telling the boss bow valuable we are without actually showing him.

A mechanic will seldem improve his craftsmanship when he has only himself for a model to copy.

You will have to pay for safety when you try to get along without it.

Think, and your work will be a thouand times easier, no marter what kind of Job you have.

Aladdin's lamp can't hold a candle to your own brains, if you rub them once

There's no excuse for errors made in pure carelessness.

A few men like to take credit for all that is right about a job and blame someone clae for all that is wrong. But they don't get very far.

Plenty of 4cod oil in the right place helps to take the kinks out of production, but it never does any good on the floor.



Old Bill, mechina shop foreman

Always clean out the chip pan before machining copper or brase.

Keep the ways of lather and planers clean and well olled; frequent wiping with close waste keeps the machine in the pink of condition.

A good workman generally has no difficulty in getting a good job.

### Double Rod Holder Speeds Up Welding Work

O SIMPLIFY the work of welding, it is possible to make a simple holder for gripping a tluck and a thur piece of weiting rol at the same time. Then, if the work requires a large amount of added metal at a certain stage. the larger rod can be used: and at another stage, when only a small amount of metal is required, the

smaller rod can be presented to the work without an instant's delay

The holder, if made as shown, requires only a short piece of tube of a diameter to

Light and heavy welding cods gropped in the one holder for making varied repairs

take both rods at one time. Tins is welded to a bandle made from cound stock A sheet metal tombing piece acut V-shaped at the ends, drisled in the center, and bent so that it will pass over the handle and grap the rods when premed against them by a short coil spring.

To load the holder, the binding piece is held back

against the spring while rolls are slipped in the tube. Anyone who has tried to manipulate two rods without a holder will appreciate this idea.—ARTHUR KENDALL.

### Collet Jaw Adapter Eliminates Trouble from Chips

WHEN collet jaws of the split and draw-in type ore used for holding work which is to have any form of hole

bured or drilled. the chips often cause transie by fooling the chuck.

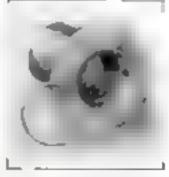
On a great variety of pieces this difficulty may be avoided by the use of an auxiliary member a seeve. split on one side only, and with

chips from entering the collet jaw at all, and thus cure the trouble.

The photograph shows a case in point, The bushing should have as thin walls as the work will permit, and be split on one aide only. A pin in the face of the collet allows the husbing to be located so that the split does not come near any of the splits in the collet.

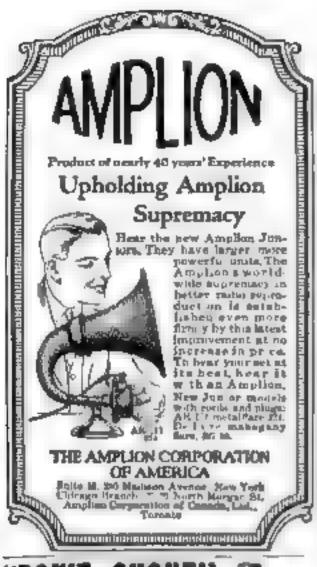
The enlarged flanged end of the bushing may be as large as the external end of the collet, to insure no chips getting inside the chuck. The closed end of the bushing makes of this member a bucket affair which, when removed from the collet with the work therein, may be shaken free of all chips, and cleaned readity for

receiving another piece for machining, In this instance the auxiliary bushing is shown with the partly becod-out work still in place. - O. S. MARSHALL,



The auxiliary bushing with work in place

closed maer end. This will prevent the



bear you. I can hear now we as a y body BOW F MAN THE MORLEY PHONE. I've a pair to try care now, but they are I had them in myelf only that I hear all right." The Morley Phone for the planted and to the upon lawlett a comparishing wought

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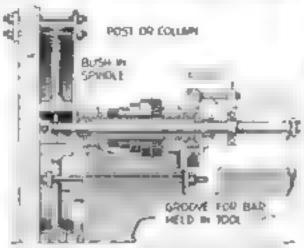


### Boring a Large Pulley on a Small Lathe

That Old Bill, with all his ingenuity, has rivals in far corners of the world, is evidenced by the following from a reader of Popular Science Monthly living in Melbourne, Australia

HAVE been interested in Old Bill's rigs as described in Popular Science MONTHLY, and I will describe a method I used to have a large wheel with a 12-in. gan bed lathe.

There was a friendly post at the end and to the rear of the lathe, which I

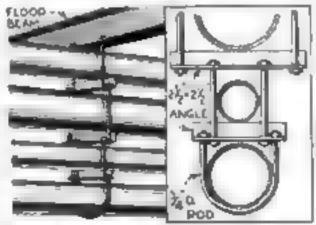


The pulley was bured by passing a bar back through brainings in the bendstock spindle

used to support the wheel. I also clauped the spokes of the wheel to the hed of the lathe. The boring bar ran through bushings in the spindle, and was driven by a pin projecting from the chuck. Feed was obtained by having a geoove in the boring but to engage a bur held in the tool post.

The tool was ground square-edged to avoid inde pressure. G. E. Buttensata.

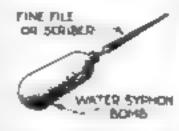
### Carriers for Heavy Pipe Lines



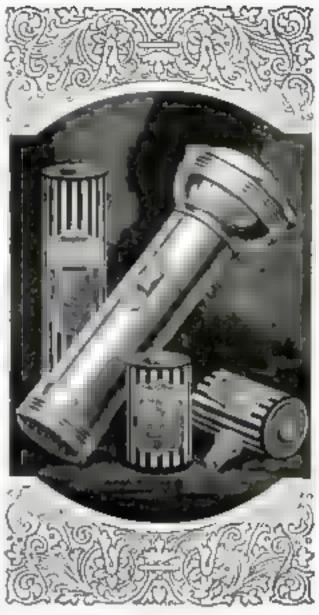
LLUSTRATED above is an efficient and economical method of langing pipes from a floor beam. The pipes shown range from 0 to 10 m, and carry stems and water in the basement of a power house. W. URLMAN

#### Unusual Tool Handles

WHEN saw a machanst using a fine file with what looked to be a beautifully finished metal handle, such as I



had never seen before. I asked him where he had got the hundle. It was a discharged "homb," like those used in soda water suphons. -S. W. B.



### Better Flashlights

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SPORT FACTORIES. Aurora, Dilnois

the big Prize Offer on page 4 of this issue,

### Shop Method

### How I Use Silver Solder in Doing Repair Work

By R. C. LEIBE

WHILE woodworkers are familiar with silver solder as a medium for joining band mws. its useful properties sometimes are overlooked by many mechanges. Silver solder is an alloy of about 70 percent miver and 30 copper, with sometimes other metals in small quantities. It is sold in thin strips 34 in, wide. in the absence of the commercial product, it is possible to do satisfactory work with silver of a quality corresponding to that used in coins if it is beaten into a thin

Jointa made with aliver solder are very strong, bence its use for band saws. They will also atand considerable heat, for the melting point of adver solder is rather high. Once the trick is learned points can be made by anyone with almost no tools

Figure 1 in the illustration shows the spring from a phonograph made almost as good as new with the aid of silver solder. The broken ends are beyeled off as shown and carefully cleaned. A flux is applied, a strip of solder put between the prepared ends, and red-hot tongs clamped on the joint to melt the solder. The tongs are kept on until cold, when the joint is dressed to the thickness of the original spring.

The flux which the writer has found most successful throughout a lifetime of expenence in bearing it boens with enough water to make a thin paste.

I's FIG. 2 is shown a crossout onw repair.
The ends of the break were filed to a feather edge with a lap of about \$5 m., the laps were covered with the paste, a strip of adver solder was put on, then the laps were placed one over the other and red-hot from bare applied. Clamps were used to ussure the tightness of the joint. In this case, to retain the temper, water was applied after the solder had melted. When rold, the sides were filed off and the saw was in good shape for more hard

Figure 3 shows one of the most difficult jobs encountered. It was necessary to maintain the length of the measuring tape, and everything had to be done carefully. The enlarged view shows clearly the imped joint and the added piece. In this case the joint was clamped tightly together while cold, and then clamps and tape were beated with a blowtorch.

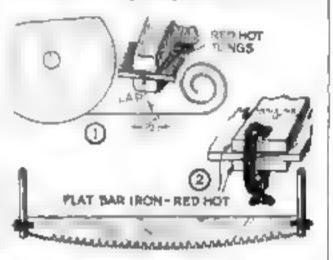
In Fig. 4 is shown the method of repuring an expensive gold knife valued as a gift. A tmy strip of silver solder was placed between the tongue and the groove, and the blade beated in the one spot with red-hot tongs.

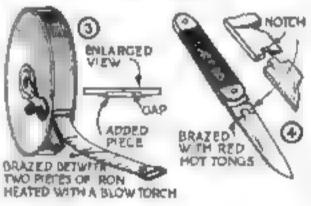
METHOD of repairing broken gears

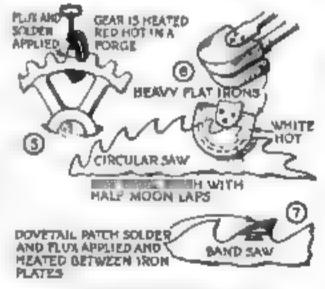
thing heated in a forge. Thu type of repair can be carried out even in the country, where few tools are at hand

Figure 6 shows the use of special tongs. m order to replace a section in a large and expensive circular saw. The new saw steel patch was put on in just about the same way as has been described. At Fig. 7 is shown the style of repair chosen for a band saw which had lost a tooth.

Numerous other examples could be shown, but the penerole in all of them is







Method of espairing econocut, circular, and bond sows, springs, tapes, knives and years.

the same. An important item is to have the thickness of the solder film uniform. The mechanic with a little ingemity and some forethought will have no difficulty in repairing with silver solder many things that would otherwise have to be replaced.

TESTS FOR HARDNESS of steel parts made with common files are unreliable in cases where uniformity in duplication is required. Files themselves are apt to vary in hardness and quality like other steel pieces. That a metal cutting tool such as a drill, milling cutter, renmer or tap A is shown in Fig. 5. The brase is pre- can be filed is far from an infall ble indipared while the gear is cold, then the whole cation of cutting qualities or durability,







With a treath



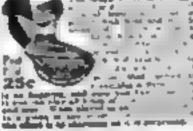
Good Luck Ring of Blanch

### Explading Cigarettes







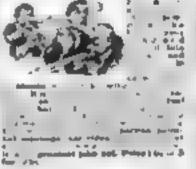


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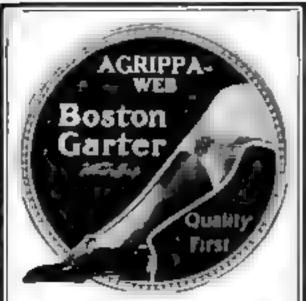
a Finder MI ray and a Lasyngan was read fitting. It is worth all the user ties a the eye. I do for man fit the need one. Disn't man it Sent by

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### Better Shop Methods

### Driving a Countershaft at Right Angles

A LETTER was received the other day addressed to Old B.H. the machine shop character whose mechanical shortcuts and shrewd observations have long been a feature of this department. It was as follows.

I have a simple problem which I know you can naive quickly, although it is bothering me quite a bit. I wish to run a countershaft at right angles to my line shaft. What is the best and least expensive manner in which this can be booked stir?

The countershaft should run about 500, the main shaft turns 1,000. Outfit should carry about three horsepower, although my present work will use only about one third that.—F. H. C., Mannaville, N. Y.

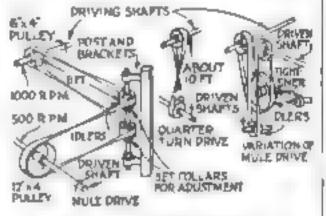
While there are several solutions of the problem of running one shaft at right augles to another, it is almost impossible to any with definiteness which is better without knowner all of the conditions.

Gear manufacturers have developed their art to the point where they can supply gear boxes to meet any speed condition, and probably this would be the best construction, though the most expensive. Do not make the mistake of trying to run ordinary gears out in the open at this speed. For successful operation, it is necessary that the two gear shafts be mounted in rigid bearings, and that there be an ample supply of oil.

The least expensive method, and the one that I should ordinarily recommend, would be to use a belt. The traditional scheme involves the use of a so-called mule stand, which is a vertical shaft carrying two idler pulleys. Sumetimes the pulleys are carried on separate shafts, each capable of some angular adjustment.

This arrangement works very well in the usual conditions, although the belt must be kept very tight in order not to run off the pulleys. For a speed of 1,000 revolutions per minute on the line shaft and for three horsepower, I should recommend that the pulleys be 6 and 14 m., and that a 3-m. belt be used. The distance from the pulleys to the mule shaft should be not less than 6 ft. and perhaps should be more, for this type of drive is at a disadvantage with pulleys of different sizes, and the farther apart the pulleys are, the better the installation will be. The male pulleys should be about 12 in, in diameter and of at least 6 in, face. They should be arranged so that they can be moved up and down in order to make the belt stay properly on its track.

The problem does not state whether the shafts are both at the same elevation. If they are some 10 or 12 ft. apart, as



Diagrams of voing the most common model of mule drive, a variation of that drive and, omiter, an Ordinary quarter turn drive

would be the case if the driven shaft could be put under the floor, a simple quarter-turn belt can be put on, which will give very satisfactory service. If the conditions will permit, this will be belter than the mule drive. The same size pulleys and belt would be used.

the three variation of the mule can sometimes be used where the shafts are at about the same level, and has the advantages that the belts will always run properly and that the tension of the belt can be regulated. Here the idler pulleys are on the floor, and the belt goes down and up. One of the idlers can be arranged to be adjustable. The diagonally placed siler should be set so that the centers of its faces coincide with the centers of the faces of the driving and driven pulleys.

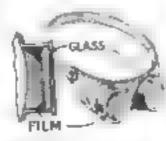
—James Ellis.

### Safety Eye Protectors Made from Cheap Goggles

IN FIVE and ten cent stores very cheap eve goggles may be purchased. In spite of their low cost, these goggles may be

converted into serviceable eye protectors for the machinist or metal worker.

The glasses with which these goggles are fitted are first cleaned. To the back of each is cemented a transparent disk of cel-

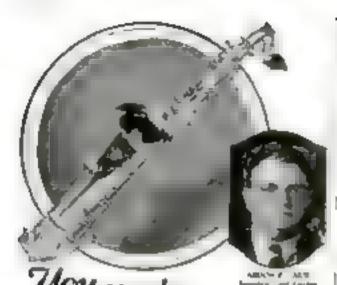


Celluloid is revocated to the plane epigeces

uloid. If no other celluloid is at hand, the disks may be cut from photo-

graphic film from which the emuls on has been removed. Any celluloid centent may be used, or a cement made up by dissolving celluloid chips or small cuttings in sectors.—W. J. E.

Electricity now has been called belts a firm grip on the pulleys. The electric phenomenon utilized is known as the Johnson-Rahbeck effect. It presupposes the use of metal pulleys, coated with any smooth, hard and durable municing substance. The friction of the belt causes it to become charged with electricity on its inner surface. The metal of the pulley becomes charged by induction with electricity of the opposite pole and a strong attraction between belt and pulley is developed.—Erner Wellers.



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### Better Shop Methods

### Straightening Attachment for Bench Plate

WileN straightening short rods or shafts on a small beach plate, a much harder blow than is really necessary must be delivered because the work is backed up against its entire length on a tlat surface. It is much better to support the work on two points oncy, then a light blow will be id the piece more than is not essary to bring it straight, and the natural



The rod to be straightened is rested upon two anvils, which can be adjusted interally

spring of the metal will force it back to parailel. Contact points for this me abvionely should be adjustable. The attachment illustrated was designed for this,

A hole was drilled in the bench plate and a prese of round stock driven in. This paece carries at right angles a tightly driven rod, and at either aide is a sliding anyl made from round steel somewhat higher than the central piece.

In operation, the work in rolled along the flat plater and the high spots are noted then the anxils are poshed in or out and the bending is done - II MOOKE.

### Gage for Alining Shafts

N INEXPENSIVE gage for alming A shalting consists of two pieces of light, slender, stiff wood and two clamps, When the pieces are clamped together to give the correct length, it is a very simple matter to check up two shafts.

This gage in far superior to a cord because it does not stretch or shorten



died with greater ease and certainty. If flooring or other tongue and grooved stock is used for making the gage, the two pacces may be adjusted still more quickly W. F SCHAPHORST.

and may be han-

### How the page to reacte and used

FOR polishing brass, add 3 oz. of pow-dered zotten stone and 4 oz. oxale acid to 2 qts, of min water. Mix well and let stand for a day or two before using. A maste for rance strops may be made of 1 on, levigated made of tim, 14 on, powdered exalte need, and 20 gr. powdered gum mixed with a small quantity of water. Rub into rough side of strop.—P. N. C.

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### Learn in Chicago, Electrical Center

Of the World

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### Send Coupen New for My Big, New FREE Book!

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### R. C. LEWIS, Provident.

Coyne Electrical School 1300-10 W. Harrison St., Dopt. B. 136 Chicago, Illinois

Dear B. C. - I suce want one of these big bandpoints 2x15 books with 5 neture photographs general a two colors stone i quick of hone olding ing me. the cell in about the Free high-tend care and Two Free Colorses.

Name

A delivery

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#### EARN While You LEARN

My Employment, Department being you get a job to sure a good part of your represent and emiste you to a good job on graduation.

#### Hear WGES on the Air

Listen in on C C Y 16 If Radio Station Wilkle, wave impti-

#### You'll Enjoy a Season in Chloago-the Wonderful Resort City

Chirago, on beautiful Lake Markipun at the Nortest's Plays attend. Free Hathing Benches Security In Tarks. Excep-ment Brake and the great Managema Pley Zoon, Bull Parks. The day get market plays tracked in possible for you. In analysis at these and staff have



### COYNE ELECTRICAL SCHOOL

Founded 1899-27th Year H. C. LEWIS, President

1300-16 W. Harrison Street Dept. B-134 CHICAGO, ILL.

### Prize Winners in the May Contest

(Cont thent from page 4)

A. C. Rose of Wilkinsburg, Pa., wins the first price of \$50 for his letter on the value of the International Correspondence School Course and their textbooks. which he points out have a permanent Value as 'reference books or trouble shooters." Mr. Roe's perze-winning letter followa

Contest Editor:

The International Correspondence Schools advertmement states that "You can't beat those I C S textbooks for good round practical knowledge." I il tell the world you can to as I was forced to leave public school and soon realised that to advance in any pro-

(Continued on page 106). 

### CASH PRIZES

For the best letter of 170 words or less answering the question—

"What advertisement in the 'Money-Making Opportunities' Section interests you most-and why?"

we will pay on August 10th the following—

#### CASH PRIZES

First Prize \$50.00 25.00 Second Prize Third Prize 10.00 Fifteen Prizes of \$1.00 Each 15.00

First read every advertisement in the Money-Making Opportunities Section on pages 104 to 127. Pick out the one that interests you most and then write a letter-not exceeding 170 words -telling us why you find the advertisement you have selected the most interesting.

Entries for the contest will close on August 1st. The prize winners and their letters will be published in the September Issue of POPULAR SCIENCE MONTHLY.

> Address your letter to Contest Editor

MONEY-MAKING OPPORTUNITIES POPULAR SCIENCE MONTHLY 250 Fourth Ave., New York

### Prize Winners in the May Contest

(Cantinuel from page 10.0)

fession, a thorough knowledge of the fundamental principles was emential. This led to an 1-C > Electrical Engineering course, which also helped my grammar and spelling-

The Wratinghouse Electric Company is ful, of I C S men in good positions, and I consider myself in this claim, being at present Section Engineer in charge of Code and Insulation, Homewood Plant, formerly Repair Superintendent, Detroit Service Dept., also author of four books.

The above built on the foundation laid from the fundamental facts given in L.C. S. textbooks, which are also excellent reference books, or trouble abouters, that can be used to overcome everyday problems.

Yours truly, A. C. Rose

THAT the graduate of a technical school has certain advantages over the college man who takes an A. B. course is forcibly brought out by William O'Neill, Jr., of Downers Grove, Ill., in his letter telling how Chicago Technical College started a friend of his on the road to success. Mr. O'Neill's letter wins the second prine of \$25.

Dear Sir

The 'treh" school graduate has one advantage over the college man; he can cash in on his knowledge source. This fact was brought home to me by the following interesting occurrence.

When our high actual class graduated three years ago, most of us went to conside to make our marks. But one hid couldn't make it lie went to work as timekeeper for a local contractor—and went to might school at Chicago Tech.

The following spring his employer took

him into partnership.

See months inter-last fall—he left cold Chengo to be consulting engineer to a Florida land development company.

This has shown me the value of a greatest education. Yours trusy,

WILLIAM O NEEL JR.

RAY Landholm of Everett Washington, tells how his lack of opportunity for education through the public schools was more than offset by taking a course with L. L. Cooke, Chief Engineer, Chicago Engineering Works. The third prize of \$10 goes to Mr. Lindholm for this letter

Contest Editor:

The ad that I shall never forget or repay in your Money Making Opportunities in the one of L. L. Cooke, Electrical Training at Home.

When I envolled. I did not know the first thing about electricity as my education was not short by having to go to work real young, but let me say there is no excuse for a man not knowing when opportunities were never greater, which the ada is your magnature point out. I am not only learning fast, only having taken 35 learning, but I have invented an automatic switch which I have been able to build with my little studying each night, which I know will help the electrical world. I also have more ideas to put on the market.

I am writing to one of your Fatent Attorneys ads, where I found Cooke's wonderful training, to obtain a patent for me.

RAT LINDROLM

Thousands of people write every year telling us how they have been beloed to win success, and all that success brings

(Continued on page 106)



### This Ornamental Trellis Work Will

### Add Charm to Your House or Garden

BEAUTIFUL as this trellis is, it is surprisingly easy to build and well within the ability of any man handy with woodworking tools. And the construction is sturdy enough to insure the trelhis lasting for years.

> Omamental trellis-work have the one illustrated, to

gether with other designs for trellis-work, are available in the Home Workshop Blueprint No. 14

Architects often use well designed and carefully placed trellises to give an added attraction to poorly proportioned houses

Full working details and building material for trellises such as pictured in this advertisement are contained in Blueprint No. 14 which will be sent you by return mad on receipt of 250

#### POPULAR SCIENCE MONTHLY

250 Fourth Avenue New York.

#### \*\*\*\*\*\*\*\* MAIL TODAY \*\*\*\*\*\*

I am enclosing 25c for which please ornd me Blueprint No. 9 of the Arbor, Gate and Swing.

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THE LANDON SCHOOL 161 National Bill CLEVELAND, B.





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### End Your FEARS in 48



Circ sta 1 days and 1'll prove to you that I can give you real courage courage that wine-courage that trushes all electroles. I can give you Grit and Gumption enough to light your weight in wildcate.

By DAVID V. BUSH The Man Who Destroyed Foor

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### Grit and Gumption Wins

You must see this near back to which for Bush given his so rets of real he-man courses. It is realed Spain's " You can I read it without a nathebraid of stay poles without a best sides of rast-blanded courses.

This book is decisived to be the masterpiece of Dr Physic, who has automic, through in America's greatest cities and shown thousands the one way to bear it, prosperity and happiness. Write for this amaking took today. Send only 36 rests in 'old laystent I' in any not delighted, return the book within 5 days and your money will be instantly refunded.

DAVID V. BUSH, Publisher 225 N. Michigan Bivd., Dept. K-967, Chicago, 11t.

### Prize Winners in the May Contest

Ten, even an page 6

with it, through the opportunities presented by advertisers in Popt LARNOEFNCE MONTHLY.

There are foday just as big opportan ties for you as there were for the merwho wrote the letters we have quoted Just fill in now the coupons or write the advertisers in the Money Making Oppotumities. Se tion who are ready to bely you reach the top of the trade or profession you have a natural heat for

Take the first step along the road to success by writing today to the advertisers whose offers interest you must These advertisers have special zed to fit ting men for success. Get your share of the good things in the world by taking advantage of the money making opporfunction in this section.

### Complete List of PRIZE WINNERS in the May Contest

FIRST PRIZE \$50 A. C. Roe, Wilkinsburg, Pa. (International Correspondence Schools

SECOND PRIZE \$25 William O Neill, Jr., Downers Grove, Ill. (Chicago Technical College)

THIRD PRIZE \$10 Ray Lindholm, Everett, Washington Chicago Engineering Works.

PRIZE WINNERS who receive 3).00 each for their letters:

W. A. Ripley, St. Francis, Wis. Jaternational Correspondence Schools:

L. D Hall, Huntaville, Ala. (The Rhoder Manufacturing Company)

Mea. M. A. Baher Cooper Texas (Maller)

W. B. Calboun, Repid City, II. D. (Theo. Audet & Co.

Homer Sherman, Strawn, Teans (Chief Draftsram Dobe

Mrs. May Hunkin, Persu Gap, Texas. Sweeper Automotive & Electrical School

W. R. Glase, McCook, Nebr.

A. D. Abrams, Wilmington, Del. (National Salesmen's Training Assa.

Joseph H. Leur. Charleston, S. C. (Chicago Zagueering Works

Juck L. Baker Cooper, Texas. (International Correspondence Schools)

Mrs. L. E. Davis, Harrisonburg, Va. (La Salle Estenuos University

Leoneth McKenzie, Alba, Texas (Biveprints-Popoler Science Monthly)

J. R. Cherington, Gallipolls, Ohio (Charence A. O'Brien

A. M. Crowell, Durtmouth, N. S. (Chicago Rogineering Works)

R. W. Cerr., Parkersburg, W. Va. (Intersational Correspondence Schools)



## Look What These Cooke Trained Men Are Earning



Makes \$700 in 24 Days in Radio

"Thunks to your interesting Course I made over \$700 to 24 days in Ranio. Of course, this is a little above the average but I run from \$10 to \$40 clear profit every day, so you can see what your training bea

FRED G. McNAliff, 446 Spring St., Affents, Correla.



## \$70 to \$86 a week to Jacquet

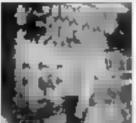
Now I am specializing in Auto Electricity and he tery work and make from \$10 to \$500 work and am just getting stanted. I don't betteve there is another school in the world like years. Your (esseen are a real joy to study."

ROBERT JACQUOT, 1905 W Colorado Ave., Colorado Eprinas, Colo.



## \$20 a Day for Schrock,

"Upo my name se a reference and depend on the as a booster. The biggest thing I ever
did was answer your advertisement. I will averaging better than \$500 a month from
my own business now. I took
to make \$18.00 a week." A. SCHRECK, Phomis, Arising



## Plant Engineer-Pay raised 150%

"I was a dambbell in electricby uptil I sot in touch with you Mr Cooke, but now I have charge of a big plant including 600 motors and direct a force of 34 meu - electrical and the charge of 34 meu - electrical and ciana, helpera, etc. My salar-has gone up morethan [57], GEORGE htt: New Origin El Calamet flag. Hatyaha, Man My sa ary

It's a shame for you to earn \$15 or \$20 or \$30. a week when in the same six days as an Liettrical Expert you could make \$70 to \$200-and do it easier—not work half so hard. Why then

remain in the small-pay game, in a line of work that offers no chance, no bg promotion, no big income? Fit yourself for a real job in the great electrical industry 1'll show you how.

## Be an Electrical Expert Earn \$3,500 to \$10,000 a Year

Today even the ordinary Electrician—the "acrew driver" kind—is making money—big money. But it's the trained man—the man who knows the whys and wherefores of Electricity—the Electrical Expert—who is picked out to "hoss" the ordinary Electricians—to boss the Big Jobs—the jobs that pay \$3,500 to \$10,000 a Year. Get in line for one of these "Big Jobs." Start by enrolling now for my easily learned, quickly grasped, right up-to-the-minute, Spare-Time Home-Study Course in Practical Electricity.

#### Ago or Luck of Experience No Drawbock

You don't have to be a College Man; you don't have to be a High School Graduate. As Chief Engineer of the Chicago Engineering Works, I know exactly the hind of train ng you aged, and I will give you that training. My Course in Electricity is simple, thorough and complete and offers every man, re-carding of age. Schoolson of the course. gardless of age, education, or previous experience, the charge in become a severy about time, an "Destrical Ma-port," this to make from \$10 to \$200 a week.

## No Estra Chergo for Electrical Working Outlis

With me, you do practical work on home. To unfurt right in after your first tow lessons to work at your profession in the popular way and make extra money in your space time. For this you need looks and I give them to you thing complete working outfile with just, respecting ing unframedle, and a real shortric money to suffice in all.

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# Quick Action Advertising

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## Boats and Launches

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With 1975 Representatives in every factory in the United States. Popular discount Mouthly, 256 Fourth Ave., New York.

Renes 30 Cents a Word. A 10% discount is allowed on all contracts for us consecutive assertions. Advertisements intended for the Sept., 1926, imag should be received by July 5th.

#### Blue Prints

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## Electrical

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## Financing and Investments

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## For Sale

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## For the Home

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hth a detective Flare big money to experience peccasary Write for his real rewards for information. C I Ludwig, 414 Westover Bidg. Ramos City, Mo.



## Why I. A. Gould Received Two "Raises" and C.E. Veth a Salary-increase of 200%

FROM the great plants of the Smith Agricultural Chemical Company, at Columbus and Indianapolis, thousands of tons of fertilizer animal foods and sent\* under the brand name bacco- are shipped to a I parts of the United States.

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"We can only all note the rapid success of them two men, writes Marshad A Smath heat of this great against states, to their energy and it is use, together with the practical kin whose gained then the pursuit of LaXella training."

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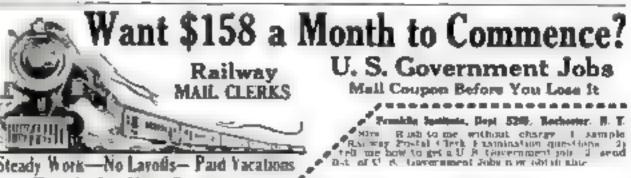
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## The Magic Eye That Sees across the Ocean

(Continued from page 19)

shadows of varying intensities. Right here an amazing thing happens. Every time the light flashes through the little window, the sensitive conting on the walls of the bulb reads forth a bombardment of little particles of matter known as electrons. Immediately these electrous form a path of escape for the electricity dammed up in the connecting wires under pressure from the battery. As the electrons jump across to the metallic element. at the center of the bulb, a circuit is comparted, and electric current flows. This corrent. ' stepped up by ampadiers, operates the sending matrument.

THI S. for every patch of light on the picture we have an electrical unpulse, varying in intensity according to the intensity of the light. These are the impulses that are carried by tadio of wares across thousands of miles.

Various methods have been employed to pick up these impulses at the receiving end and translate them back into pictures, although the function of the pholoefectine cell is virtually the same in every case. In one method, for example, the impubes are made to actuate a pen which arnwa paratlel lines of dots and dashed corresponding to the shadows in the origin mal picture. In moother, a beaut of light varying in intensity according to variations in the electric current moves in parallel linea across a photographic film.

While the successful transmission of pictures is a comparatively recent achievement, the photo-electric rell or not new.

Its history dates back to 1817, when J J Bergelius discovered the element scleamm. In its normal state, selemon is a poor conductor of electricity, but under a beam of light it instantly becomes a good conductor. Thus the first photoelectric cell was a relenium cell translating light variations into electric variations.

YEARS ago Alexander Graham Bell. the inventor of the telephone struck by this property of selenium, made use of it in an instrument for transmitting spoken words to a distance by means of a beam of light. This instrument he called the photophone, and later the radiophone. In more recent years the selenium cell has been employed to the invention of talking movies, notably by Dr. Lee De Forest.

For the transmission of pictures, selenium now has been replaced by the mecalled alkali metal photo-electric cell already described, because selenum while highly aensitive to light, was found to be too plow for picture transmission.

This matter of speed has become an allimportant factor with engineers in perfeeting a system of television. Thus far the best speed attained in transmitting a photograph by wire is about four minutes. On the average, it takes about twenty minutes to send a photograph by radio. Let to produce an action picture that will appear lifelike requires the speed of a motion picture film-exteen photographs a second,

It's a long gap between the two. Still. inventors today say they are herdging it.



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## Millions Are Committing Slow Suicide

(Continued from page 11)

m combination, are known to have caused drath at Bellevoe, and no doubt elsewhere. In many doubtful instances they are presumed to have had part in causing death. And in instances almost innumemble they are presumed to have coninbuted illness. The fact is that the symptoms aroung from use of these substances in combination and in alcubol are so varied and so new in kind that nothing short of an autopsy by an expert tells the

In other words, if we drink bucch, our bodies are likely to deceive us and our doctors as well.

But dead men tell no bes.

So I went to a man who knows more about dead drukers, I am told, than anyone else in America.

ALEXANDER O. GETTLER is the touscologist in charge of the Medwal Examiner's Office in New York City. He m an authority on pourous and often called on to testify throughout the East. He is also associate professor of chemistry in New York University and it in charge of the chemical analyses made in Bellevue and Albrd Hospitals.

He estimated, though the count has not carefully been music and in the confused state of diagnosis could not at best be considered final, that during 1925 there were 500 deaths: almost ten every week -directly or indurectly due to booch, in Bellevue. Many of these, he said, occurred in the medical wards. And inaddition, he stated, there have been hundreds of cases showing the cumulative as well as impediate effects of dripk, including not a few showing signs of metalpossing presumably caused by contact of alcohol and its current compounds with metals such as tin and lend.

DROHIBITION has brought about Conditions that amount to an entirely new problem." he told me. "In many instances it is impossible, short of a chemical and increscope examination of bradus and other organs, to say specifically that death came from this or that prosonous substance takes internally in drink. We can't explain most of our alcoholic deaths without autoposes. Most of them do not show conclusive agas of one poisonous substance or another. Death usually results from congestion, or. to put it in popular language, from the fatture of one or more organs to function. The effect may have been immediate. It DIAY not.

And so far as we know there has been no accentific analysis anywhere in the I nited States of the physiological effects of booch in its variety of forms, Recently, however, federal authorities have become interested, have tent representatives here, and we have been encouraged to undertake systematic analyses with a view to testing out theories we have.

"Our main theory is that there is readue from denaturants that the Government requires manufacturers to put in industrial alcohol to make it undrinkable.

"This, though, as only one phase of

the problem as we see it from our office. There are two major classifications of modern whiskey. One kind is that made from industrial alcohol duly cooked and doctored with caramel and beard oils such as creasote and giveering, along with perhaps some rye extract or Scotch extract or whatever else it needs, even a little real whiskey. The other kind is the mountaine stuff which contains free acids and aldehydes and differs in other ways

from the synthetic liquors. "Formerly, of course, all whokey, except the 'third rail' variety, was used in charred barrels, with the result that various substances which are not desired combine with one another in what we call esterification. Not much is known about the esters except that they are less poisonous than the substances from which they are formed, and that they have a smooth taste. In freshly made whiskey there is, of course, no opportunity for poisonous substances to neutralise one another.

O'R theory is that possessous sub-stances, like those taken internally day after day by habitual deinkers of modern boose, keep on gradually affecting the various organs and nerve centers until they are reflected in illness of one kind or another and finally produce death."

Another Believne official, an ardent "dev by the way and a student of alcoholic and mental cases, added

"In New York State the Hospital Commission reports that insunity from use of alcohol has trebled in five years. I doubt the accuracy of these figures, because the symptoms from use of the stuff drunk these days are different. A better check. and still not a conclusive one, is that of the Metropolitan Life Insurance Company. Reporting for seventeen million industrial policy holders, it says that though the death rate in general was slightly lower in 1985 than in 1924, there was an increase in the rate for influenzaand pneumonos, which is frequently aggravated by alcohol, a marked increase in diametes and circums of the liver; and, as between 1980 and 1985, an increase of nearly five hundred percent in the deaths reported how accurately no one knows —from alcoholium."

A<sup>S</sup> A fact, no one really can my past all question what the new booch, the new chemistry, the new chemical warfare on our bodies, is doing to us altogether.

But this we know

Nothing whatever that we take into our bodies—not even the air we breatheis without its effect; that there is not one chance in ninety of prohibition hooch being up to the brag, not one sound argument -except slow smerde-for its use.

It may interest you to know that when one of our pupils suffered a breakdown and was ordered to bed for two months, our faculty advisers and editorial staff jointly decided that a subscription to a good magazine would mean much to him. So POPULAR SCIENCE MONTHLY was at once selected.—H. A. W., St. Paul, Minn.



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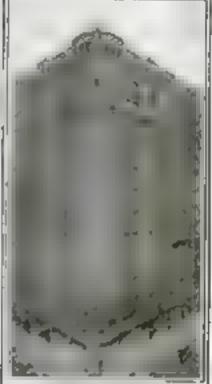
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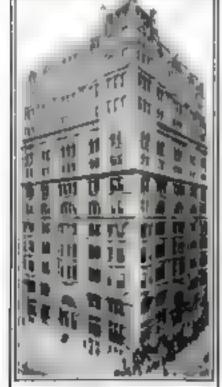
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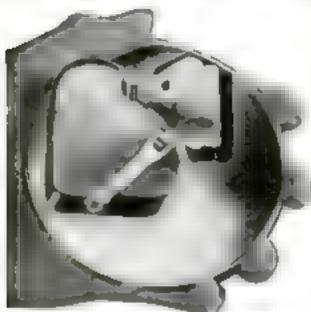
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## Old Patent Models at 25c Each!

Cantinued from page 2.

work of some stonecutter inspired with the idea of putting more life into graveyards. 'In place of the usual epitaph, the unventor had inserted in the stone a circular glass case, enclosing a lifelike picture of the deceased.

Almost as odd was a model violin which bore the date of 18-7. It was easy to imagine that its creator, one William Randle, had been troubled in his fiddling with broken strings, for to the tailpiece of the violin he fastened four sparal springs to which be attached the strings!

All the while, as Sam lifted the models down from the shelves, he proudly demonstrated each in turn. "See, here's the idea," he would my turning a wheel or pushing a lever to make the thing go. At last, however, he came to one labeled "Converting Motion Machine, a tangled array of brass wheels and rods.

"HIS one here has me lacked." he and finally. "Your guess is as good as mine. The fellow who made that must have speat his life at it."

An equally complicated machine of wheels and cogs was labeled "Fog Alarm." The secret of just why the fog should make it run was another one of the mysteries that lay buried in Cohen's cedar.

We had a lot more of this brais staff." and young Cohen, "but we serapped it all for what we could get out of it. We paid anywhere from half a dollar to five dollars apiece for these models; that Edison invention you saw out on the ear cost us one dollar and ten cents. We figured wo could find people who'd want the models, for they say you know that the whole world passes through Orchard street at some time or other. But the only ones who have bought them have been a few mechanics wan could use the parts, and a few cornosity hunters. You'd thonk people would want old inventions, but

Who does? In other dark holes beneath the East Side pavement I subsequently found other piles representing more hundreds of ideas. What will become of them? Will they, too, finally end in the junk yard? And will a similar fate overtake thousands more of the models stored in the warehouse in Baltimore? Of these. I learned, shout 500 have been sold, most of them to relatives of the inventors or to friends who have a personal interest in them.

THE other day for example a voting A man who visited the warehouse mnurred for a cert in model, giving the number of the patent.

"How about twenty dollars? Would that be the right figure?" he asked best takingly, when a salesman brought him the model. The miesman agreed.

Eagerly the purchaser paid his money and tucked the device under his arm

"Now that it's mme," he said julilantly, "I don't mind saying that I wouldn't sell it for a thousand dollars. It was made by my grandfather when I was a boy, and we've always wanted to get rt back in the family

The invention was a nondescript device

for lifting water, which had gone the way of many patents and had never been applied. As a machine it was unimportant. but as a family treasure it had sentmental value

The Baltimore owners of the models, J. S. Lee and Bernard Shapuro, have adopted a systematic method of searching out and interesting relatives of the inventors by mad for instance, they have corresponded with the Westinghouse family in Pittsburgh concerning a switching apparatus for telephones patented by George Westinghouse in 1881 -a device for enabling 'central" to connect any subscriber with any other line in the exchange.

There are, then, some who value old inventious, although obviously such a market is extremely limited; and so, in thu strange morgue, the vast heap of models her virtually unwanted and unclarmed.

What if the inventors themselves could live again to visit the graveyards of their handlwork—the pushcarts of Orchard street or the warehouse in Baltimore? Would they call us an ungrateful generation?

I am unclined to believe that some of them—at least those who made real contributions, however small, to the sum of inventive accence—would simply smile at the little joke which the fates have played. For after all. the buttered and dusty patent mostels which Uncle Sam has swept out-of-doors were merely. The first expresmona of idean. The ideas themselves live on, giving birth to other and better ones that we can put to use

Who knows but that from the clutter in Swar Cohen's celair may aprout air is: vention worth far more than all the "junk that her there? Stranger things have happened.

## Milliona of Invisible Stars

MILLIONS of small stars feak about on the outskirts of the universe. according to astronomers. The famous spiral known as the Great Nebula of Audromeds, which seems no larger than the full moon and very faint, is made up of such stars.

Through a small telescope the spiral looks as if it were surrounded by a cloud. On examination with a great reflecting telescops, however, a vast number of faint stars are seen on the outer edges of the spiral. These are 100,000 to 1,000,000 times dinimer than the naked eve stars. and so far away from the Earth that it takes one of their twinkies a inchion years to reach us.

THE prize winners in the first of our remarkable series of "What's Wrong" contests, which started last March, will be announced in the next fune of POPULAR SCIENCE MONTHLY, As in the contest this month (see page 12), \$1,000 in sixty-three Cash Prizes will be awarded those who submitted the best lists of mistakes in the Johnand-Mary picture. Look for the first list of winners in the August face, on the news stands July 10.

## Around the World in a Yawl

(Continued from page Af)

among the clouds. That evening I landed at Taiohai in the Marquesia, my first stop."

Crusing between the islands, Captain Pidgeon insisted he had no adventures. But casually he mentioned being pursued

by a shark

"One day near the Island of Uapu," he said, ' there was a calm, and I went swimming. After a while I noticed a commution in the water. As I climbed back on the hoat, the jaws of a shark grazed past my leg."

AFTER leaving Cape Town, South Africa, he had his only senous mishap, "I was clinging close to the shore," he explained, "and it was had weather. For two days and nights I hadn't slept. I set a course that should have taken me clear of everything, then I went below, to sleep

'Suddenly I was awakened by a dult third. I had struck something. The boat humped again and keeled. Through a porthole I saw a white streak. It was shore. The boat kept washing further up, tilted over on one side. I crawled into my brack and sleet uptil down.

bunk and slept until dawn.

"In the morning I walked inland until I found a Dutch farmhouse. The people there helped me, and in three days I was ready to put to sea again."

Skirting the northern end of South America, the Islander had another close

call.

"I was awakened at midnight." Captain Pidgeon narrated. "Ly a homping sound. I stuck my head out of the cubin and there to the leeward was a huge black mass.

"STAND by for a line!" someone called out of the blackness, and I was hit on the head with a rope. A British tank steamer had seen my light bobbing around, and, thinking it a boat in distress, had come to help me.

"'Get out of here!' I yelled. 'I don't need help. 'You'll wreck me!' A huge wave nearly tossed me on the deck of the steamer, but another washed the Islander away. As she fell back, the side of the steamer struck her bowspert off and the port masses shrouds were washed away.

"There I was in a heavy sea, disabled, I lashed the tiller and rigged the jib so I could handle her. At daylight I managed to make repairs enough to get me to Port-of Spain."

Currouty still demanded details of how

he managed. How about food?

"I carried mostly dried food, beans, peas, rice and wheat," he told me. "I drank only water, I carried one hundred gallons of it. On the islands I got sweet potatoes, bread fruit yanis, and mangoes.

"Danger? There wasn't much. Of course the danger of going alone like I did is losing your footing on a slippery deck and failing overboard. The boat would go sailing off, and you couldn't catch it.

"But I never slipped "

Where to next? Captain Pidgeon himself doesn't know. But should be take a notion to see any spot in the world, for that place will be set sail.



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## When to Do Odd Jobs

Continued from page C.

it. This is wasted effort. Get the correct material and put it on quickly. You need only a pot of homemade flour paste and a few tools for the job.

Flush out the hot water tank to remove rusty sediment that damages and may stop flow in small outlet fixtures. It is not enough to open bottom faucet, since vacuum will keep the tank from draining completely. Open top faucet or unscrew top plug.

Clean roof gutters and leader traps of leaves and rubbish. Sometimes a lard a nest chokes a leader, with expensive con sequences. Rubbish left to frome in the gutters makes endless trouble.

This is also the time to glase broken windows. Where the old putty is hard, the amateur spends an hour or two digging it out. The expert does not attack the putty, but cuts a thin shaving of wood beside it with a sharp kinds. Better measure size of new glass after taking out old one, so as to insure correct fit.

NOVEMBER. Take off screen and acreen doors. Even a copper screen should not be left in place, for the weight of snow will cause it to sag. Rake and remove, or burn, leaves around bouse. They may be turned into compost for the garden. If used to bank foundation or shrubbery, cover with earth. See that outside drains around house are not choked with leaves or other rubbish.

When starting steam plant, you may need to clean water glass. It can be done easily unthout removal and risk of break ing glass. Have ready a wire-handled earthenware cup or par filled with a half pint of water and about a tempoonful of couratic and Get up five pounds steam pressure. Close both wheel valves on glass. Open petcock below glass and immerse it in and mixture. Then afternately open and close apper wheel valve. The down-rashing at earn condenses, makes a vacuum, so that the liquid is drawn into the glass and speedily cleans it. When done, close petcock and open wheel valves as they were before.

ECEMBER. Turn off water from outdoor fixtures likely to freeze, or protect them with heavy insulation of felt, cloth, paper, sawdust, and the like. It is well to have a water-tight box covering insulation. Remedy last year's trouble of no access to outbuildings because doors would not open against frost-beaved ground. Probably the garage can stand a little more cold-proofing. Double windown will belp it a lot, so also will sealing all chinks with felt or just rags. I keep s thermometer, resulable from outside banging between the double windows of my garage, and know thereby when it is advisable to increase steam heat or aild alcohol to the car reductor.

If leaks develop in the heating system, whether in formace, iron pipes or radiators, you can repair them by applying iron cement or boiler compound, a liquid for interior use in boilers or hot water radiators. Iron cement is a powder which must be moistened with water to a paste. Pack it into a file-cleaned

erack or leak, and let it harden under moderate heat for about twenty-four hours. A steam radiator so repaired has been tight for a decade

Beware of the wood box filled with old papers and other rubbish. It is a great fire menace. Get rid of it, and keep very little paper and split kindling to start fires. Only rags are even more dangerous, since they are likely to burst into spontaneous flames at any time. Keep furnice ashes away from woodwork. Never atoke a furnace, kitchen stove or open fire to make a roaring, red but blaze. It warps grates and pastes damages smoke pipes, and may cause a dangerous conflagration of sout in the chinney. Grates are also warped when ashes are left to pile up high in the ashpit.

JANUARY Shovel off surplus snow from low-putched roof. Too much weight left on long enough will bend or break a roof. Keep see from clogging leaders or breaking gutters, or damaging electric light and telephone wires.

Watch the plumbing system when the thermometer drops. That frozen pipes with a chemical that generates heat, with bodang water or a blowtorch used with care. It is better yet to take with steam especially in a bathroom and in macresable places. Take a kettle with a rubber tube four or five feet long attached to spout. Boil water over alcohol stove. plumber's gas stove, or with blowterch. Direct the steam where needed on the pipe. By this method there is no damage. to the plumbing and no danger of starting a fire in adjacent woodwork. If a blowtorch a used to bod the water, better rig up a kind of atove to spread the heat Fit a kettle to the top of an old icon paint can that is clean, make hole in side for torch flame to enter, insulate bottom of can with ashestos.

Look out for a frozen gas line which may than and flood room with gas from cocks left open. There should be a chemical fire extenguisher kept in the kitchen handly placed. This applies to every lotchen everywhere.

FEBRUARY. If you here a painter for smade work, engage him during cold weather he is not so busy then and will do a good job. The same may be said of paper hanging.

Make drainage paths for melting snow around the house, so as to prevent an unexpected flooding of the cellar with dire consequences to the heating plant and what-not. Open outside drains with salt and but water. If coher or pasement walls leak, plaster inside with coment Even a small spring may be stopped by weighting down against it a half-open tin can or section of the pape and filling with dry portland cement. For quick work, including outside emergency jobs. use the new twenty-four-hour hardening cement. This develops heat white it is setting so that it can stand winter tenperatures. It has an aluminum base, is brownish in color, and is handled in about the same manner as orthogy cement. One part cement (Continued on page 119)

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## When to Do Odd Jobs

(Continued from page 118)

to two and one half parts sand is right for most plastering and waterproofing.

Add water to steam boiler, clean fursace flues. The former needs to be done only a few times through the season as indicated by glass gage, but the flues should be cleaned at least every two With soft coal, twice-a-week weeks. eleaning may be required. A layer of most ope-secteenth tuch deep wastes one gaurter of our fuel.

Tinker furniture. Mend locks and holts. Practice a little upholstery

MARCH Look over acreens and serven doors, mend holes, point frames and also mesh if not conter-Holes can be neatly woven over with wire unraveled from a bit of mesh. If the mesh is builty sugged, remove molding and enough tacks beneath; pull edges tant with phers and refasten. The lower half of a screen door subject to damage by family dogs and cuts may be remforced with an extra layer of were cloth. If the frames are warped or giving way at the corners, remforce with smail angle troop, interior or fint.

It spect affice for goof leaks and mark with chark damp spots for later repor-Of course the actual leak may be higher up than the spot where dampness shows. and some leaks occur only when drifted mow draps and backs up water on rock as around dormer windows and in vallet c. Such abnormal leaks, unless extensive,

are not very important.

APRIL. Repeat October flushing of hot water tank. Clean up rubbish. including leaves, ashes, and banked matemal, around house. Hard contasties are good to make paths and as filling under cement walks, also to lighten heavy soil in the garden.

Take off storm doors: repair, if needed, and store. Flush out refrigerator drain.

Note effect of winter frost on foundations, astewalks, drains, etc., so as to repair during summer. There may be eracks, balges and depressions that indicate broken tile under ground. Winter experience may point to a grading job later on, whether terrace, retaining wall or shallow surface ditch to supprement underground tile or broken stone.

MAY. Put on screen doors and win-dows, Open attic windows or ventilaturs. Clean cellar: whitewash if necessary Kerosene sprayed on cement floor before awreping keeps down dust and purifies. Ventilation and cleanliness are not only hygienic measures—they prevent decay and deterioration of the bouse from celiar beams to rafters.

Drain heating plant, if steam, refill with water to safety valve, rake out flues, remove smoke pipe, clean and put aside. With bot air plant, take down pipes and clean; patch heater with stove cement.

Do inside painting and variabling before flies arrive. Also paper or decorate rooms. If broase or all amount is applied to radiators, the jub is better done with a little beat on. Ordinary paint can be used instead.

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#### BUILD A GENUINE SHIP MODEL

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## Ouestions about the Test Picture on Page 29

HAVING studied the picture of the automobile accident on page 29, you are now to answer the following fifteen questions, using the blank spaces, Allow seven minutes to complete the

 At what street intersection did the accident occur?

Answer

2 What is the condition of the weather?

Answer:

- 3. From what state is the automobile?
- 4. On which sale was the automobile struck?

5. Amout what hour of the day did. the accident occur?

Answer:....

6. Name three ways in which the automobile was damaged

Answer, (a)

7. What is the number of the street

car?

8. To whom does the automobile belong\*

Answer

 Does anything show that the driver. lost control of the automobile? Answer:

10. What is the route of the street car?

11 What or the number of the street car employees

Amorece

18. What or the date of the accident?

Name two things which indicate: that the driver was killed rather than only injured.

Answer: (a)

14. Who in the person most likely to be called as a witness of the accident?

15. How is the policeman attempting to identify the driver?

Answer

Now refer back to the picture and check your answers. How many of them dal you get right? A trained observer would be able to answer at least ten of the questions correctly

## Test of Clear Thinking

The correct answers to the seven questions are 1. false; 2. true; 3. false; 4. true | 5. true; 6. false, 7. false

Score one point for each correct answer. The average score is six.

## Connecting Ideas

The following words or their synonyms. are correct: tree, disease, pointh, fish, dyug, meat, boat, fruit, ocean, mountains, com, book, vegetable, river, crime, animal, bird, city, game, flower

An average time of a second and a half per word is good.

## Does Your Pen Reveal Your Character?

Continued from page 22,

compressed letters as a sign of a reserved. rather reticent person. Margins, or their lack, have much the same meaning to bebevers in this art. An apparent desire to let not a quarter of an inch go to waste on either side bespeaks a penumous nature; the reverse, excessive generosity or extravagance. An even margin shows good taste. When each succeeding line starts a little nearer the left edge of the paper, especially if at the start the space is quite wide, the writer, though temperamentally inclined to be exceptionally free-handed, has sufficient power of will to control the urge, and will be thruly When the reverse is the case—the first line starting quite near the edge, the next further to the right, and so on down to the bottom-the unfortunate possessor of that hand will never, graphologists tell us, have more than enough in the bankthrough his own efforts, of course—to cover his withdrawals. It will be discovered, too, that in the last named there will be a tendency to leave a greater space. between succeeding lines.

THE breaking up of words into sec-I tome or syllables is supposed to be indicative of the inductive faculty. Here is the rider of honebes, the man or woman. who will make a decoion frequently on midmet rather than cold reason. analytical mind is revealed in connected words. Often these attributes are found in the same specimen. A word will be broken in the middle, and at the same time he connected with the word that follows by means of a loop or tail. Which of the two rides induction or deduction may be discovered by a comparison of

the frequency of the traits.

The manner in which you bring a word to an end is examined with scrapillons care by the inquiring graphologist. If you have a tendency to terminate with a graceful curve that points up and to the right, it is an excellent point in your favor. He will credit you with imagination and impulse. If, however, the curve m hack over the word, or points down. either atraight or hooked won have cause for alacm. That will probably be read as selfishness. Worse yet is the terminal that not only descends but tends to broaden. This may mean stubborniess, or may simply be the sign of self-operionative. ness, depending upon the width of the stroke. The latter attribute is also read in a line extending to the right and broadening as it comes to a halt.

WHEN no terminal exists, that is, when the word is bitten off without any attempt at flourish, economy is indicated to the graphologist, and, if he finds other signs of parsimony in the hand, such as small writing and exceedingly narrow margins, he may regard it as avance.

III health, in particular any heart trouble, can be told from the handwriting, graphologists assert. The sign is a hookshaped quiver, generally occurring at the top of the stroke. In support of this contention Dr. Smith cites a case in which

one of his clients might have been saved a large sum of money had his advice been followed.

A large commercial house that maintains branches throughout the country needed a new manager for its San Francure office. A department head in the New York office was selected to fill the post, but before sending him out the firm took the precaution of having his hundwriting analyzed by Dr. Smith.

The report was encouraging in every respect save one. The man's character was excellent; his writing revealed consalerable executive abouty Smith advised that he be not sent.

"The filling of this position involves considerable expense," he said in his analysus, "and I should therefore advise that you select another, since this man is liable to drop off at any time. His heart is had."

THE head of the firm rideraled the idea. His chince was a man of fine physique; he rarely mused a day due to illness. And, although Dr. Smith's analyees had been found surprisingly accurate in the past his judgment was on this occusion averagles,

Three months later graphology was grandy vandicated. The new San Francuco manager dropped dead at his desk.

The buoyant, hopeful, ambitious person, we are tokl, will invariably write uphill; the pessionist, the man who believes his life is a facture, or the invalid, will reveal that state of mod by permitting his lines to droop toward the lower right hand corner. For that reason it is essentad that specimens be prepared on unruled. paper if a complete agaily six is to be made.

Self-control as well is determined by discovering the deviation from the horizontal. Let's assume that a person is naturally of an exoberant nature, but his position demands that he preserve a digrofied men at all times. Eventually this becomes a part of his character; he is eternally suppressing his rising special Graphologists tell us that this characteristic will be revealed plainly in the man a handwriting. Each word will use toward the end, but a return to the normal plane will be made on the word following. A person who is emilierant and excessively ambitious will write with a very noticeable trend toward the upper corner.

ON THE other hand, a person may be by nature morose but, aware of the demonstraing effect, will set a check on humself. His words, then, will have a tendency to pitch down, but will be brought back on each fresh start, or the word itself may be reined back into place before it is finished

I saw a startlingly accurate example of this in a letter I received from a friend who was spending several months in the country recuperating from a severe illness. At the start she had several encouraging bits of information. Her hearth was making rapid progress, friends had visited her the day previous, leaving her in a very cheerful mood. (Continued on page 122).



# My Rupture Fear Vanished

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priemon had given to cupture viction runl, quick, postive rollef. I know that through the discovery of a wellknown American Scientist my emphase authorized trust

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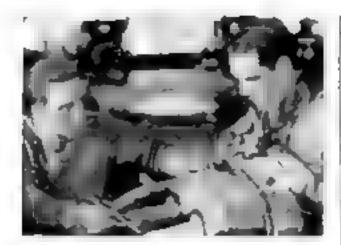
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## Does Your Pen Reveal Your Character?

(Centiment from page 121)

The writing of those paragraphs had a distinct rise.

"But," she continued, "it's raining now. I can't go outdoors. In addition, I've pist received some depressing news from home." And while she was describing her feelings regarding the weather and the family troubles, her writing took a decided pitch downbill!

The manner in which the capitals are made is mad to be indicative of the laste of the writer. Those most nearly resembling the printed letter—but in ampt form, however bespeak artistic taste.

THE graphologist pays strict attention to the punctination. When the council dotted, it may either indicate indolence or great mental activity, depending on the rest of the writing. The basis of such reasoning is thus a person may neglect. the dotting simply because it is too much trouble to brang the peu back, or his mind may be so full that it races alread of the slower moving hand.

A dot made in the shape of a dash habirally suggests impetunusuess. When it is panced threetly over the letter, you are upt to think of a person who has a place for everything and everything in its place.

How many times have you seen a writer sort of slash a person at the endof a sentence with an air of dust let me are you contended that' Such a provement has the effect of making a needge of the mark which is read as you. would expect, as a righ of trascibility. vadence or irritability.

A<sup>(1)</sup> now for the t the great revealer, any practitioners of this act. Some list more than a hundred variations, each with a different shade of menning

The same rules hold with regard to the position of the revealur as apply to the dotting of the in. When to the left delatormene right, impetuousness; flying high imagination and ambition.

The despot is revealed in the writing of a person who crushes down his I's with a short, thick bar. "Take that!" he seems to my. A person naturally quick-tempered, but one who makes an earnest. effort toward control, will, we are informed, start slashing the f with a heavy stroke, then, suddenly repenting, will lighten the pressure so that the line thins out at the end. A long light bur generally with a slight curve to it is supposed to signify wit and good humor carefully placed in its proper location and made with just ordinary pressure, the t har will bear out other signs of orderiness Posmbly the and conscient enteness. worst crossing of all is that made with a fairly light pressure at the start, then broadens, to finish in a port of brutal slash. That is the unwelcome attribute it betrave-brutality

The capital M is the most important single letter in the graphologist's alphabet. In its best form it is made with all strokes equal in beight and well separated. When the first stroke towers over the others, self-esteem is present, to a greater or less degree, depending upon the distance the

stroke projects above the others. When the first stroke is the smallest and the last the most prominent, bad taste is revealed as well as an excessive imagination.

The care with which practuation marks are inserted is said to be in threet. proportion to the sense of order of the writer. I chanced to see a specimen of the band of Gerakl Chapman, the handit, written just a few hours before he was has ged not long ago in the Wethersfield, CORE., DITTOR.

E IGHT hours before Chapman went to his death, the board of pardons met at the prison for a last-minute consideration of his case. He had been told be would not he permitted to appear, but at the very last moment the board guamoned has Not expecting the call, he was totally unprepared and while waiting to be ordered to speak he employed hanself lastening to his lawvers, pleas and making bales on what he bemself should say. The adamant attitude of all the members of the board. revealed their moswer whose Chappan medibled. He knew he was to the on the giclows. Yet while the danging moose cost a shadow across the page. Chapman principaled those notes excefully even to the extent of placing an exclamation tought after an idea that he restarred as preposteronal Cofortioactels, those notes were made to pencil, relatering them outil There is however for juiblication, another specimen of his writing reproduced on these pages.

There is one sign that bardly fits into any of the arbitrary audity soons emignerated above, and it is consistered by graphologists a very important one. It concerns the manner of fashsoning the small a o. d and g at the top of the loop. When lightly closed, they agonly a closed mouth. The writer would not be inclined toward communicativeness. On the contrary, he would be adjudged secretive. Wale open tops are marks of garrulity. partly open, they indicate a frazik, communicative hature

A decentful person, it is said, permits his words to trul off into a series of upintelligible waves or undolating strokes. The bans of this deduction is that the writer, accustomed to disminulation, instanctively attempts to conceal his real thoughts by rendering the words undeenpherable. Refined, the vice is changed into the attribute of tact.

RAPHOLOGISTS agree emphatically J that fine, copperplate writing is not to be deared. There's no character in it. they say. It is indicative of the machine mind that does exactly as it is told. Persons of great intellect often write an dlegible hand, which should not be confused with the chicography of the deceiver. Letters may be alusted over, but there is no evadence of concealment.

This, of course is but a mere outline of a fascinating study. There is sufficient. here I think however, to permit the investigator to make tests if he wishes to determine whether graphology should be placed in the ranks of the sciences.



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See Cash Prize Offer on Page 4 in front advertising section

## Rubber Made from Oil

(Cantinued from page 86)

of Technology, and Earl P Stevenson, of the Arthur D. Little laboratories, Cambrudge, Mass.

Stevenson declared that synthetic rubber is more than a fancy.

"It has not only been realized in the laboratory he said "but during the war it was produced in large quantities in Germany It can be made from a cectain class of hydrocarbons that are produced or loge quantities in every petroleum refucery in this country."

THESE are the substances which, if Left in gasoline, form gunus and stick up the valves of your automobile. To remove them, the petroleum industry each year suffers a loss close to 90,000,000 gallons of motor fuel, worth almost \$8,000 000. Yet in so desig it throws away what might be of enormous value not only in emplying the demand for rubber, but in creating countless other useful by products,

Meanwhole important experiments in growing rubber to the United States bave been in progress. In experimental gardens in Florein, Cabfornia, and in azid lands of the Southwest, the Department of Agriculture is growing some twenty differest vaneties of public producing plants. Moreover, experts of the California state. department of agriculture have been expermenting with unlikweed and other wrens, shrules and trees that provide later, and some time ago Henry Ford began planting weeds of the later vacuety in his experimental farm at Dearborn.

T THE same time attempts are being A made to perfect a method of produring from old and wormout rubber a pure product equal in quality to the erode rather as it comes from the plantations. One of the most interesting is a machine recently invented by Eugene Rovey, a French engineer. This may have devidenment the old rubber by a dijecting it to great pressure and expansing it to certain gases. Objectionable chemicals and by-products are removed and the rubber is liquefied and filtered, until the result is of high quality.

How effect we such a machine will be in. relieving a world rubber shortage remains to be seen. While heretofore reclaimed rubber, when mixed with new rubber, has proved antisfactory in manufacturing certain acticles, when used in automobile tires it has been found to decrease their docability in proportion to the amount of reclaimed rubber used.

HE success of attempts to grow rubber I plants in the United States also seems somewhat doubtful. Trees planted now could not hope to supply the shortage predicted for 1930.

And so, it seems, we must look to the chemists, those miracle workers of science. It is not at all improbable that a large proportion of our tires in the future may come, not from the picturesque rubber groves of the Malay peninsula or Nomatric, but from the depths of oil wells and from the mysterious retorts of chemista magic



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## Next Time You Buy Clothes-

(Continued from page 32)

models, and 1/2 inch to the bust measure Now about shors.

Most people make the mistake, in having their shoes, of thinking they must stick to one mae, which they regard as their size," and Charles H. Brown, of New York City, designer of footwear

THERE was the doctor for example, who rame in to us the other day and wanted a pair of size 8 shoes. We measured his foot from heel to ball, as we do in our stores, and had him try on his correct size, 8%. It fitted exactly, mug but not taut. He was perfectly astadied, until he learned that they were 8½. Nothing would budge him—he must have his 8 shoes. We couldn't understand his obstinacy, until he finally exploded that nothing could make him believe that his foot had grown half an inch since he had bought his last pair?

"As a matter of fact, each half size is only by of an useh longer than the next smaller slice. And lasts of different manufacturers differ from each other in the shaping.

anathings.

If I could give one rule by which you could test your own shoes, it would be. 'Always have the feel that the ball of your foot is resting mugly into the ball of the shoe, and not a trifle fore or aft of it.'

If you wear a size 8 shoe, your foot is probably about 11 inches long, if size 10, it is about 11% inches. But if you wear use 12%, foot length and shoe size finally approach each other—you are probably the proud possessor of a 12%-inch foot. This rather mystidying size scale comes down to us from the medieval shoemakers.

If you are in doubt about the size of your aboe, learn to read the code sizes stamped in them. There is usually a style number which you needn't bother with But the size number is usually coded in one or another of the following ways:

THE code most commonly used is railed the St-system. First appears a number representing the sum of St and the use number of the shoe. Then appears a dash, indicating a half use. If a full use, the dash is omitted. Then comes an arbitrary number, always 1. Then any digit from 1 to 5, representing the width from A to B. Thus, if your shoe has these numbers, 39-14, you are wearing use 714 D.

Another code puts the numbered equivalent of the width first, the actual size next, with a 5 for a balf size. With this code, your 7½ D becomes 473.

Null another code starts with a 2 for a half size, next has the actual size, and finally the number for the width. This gives you 2.7.4 for 734 D.

One house specializing in large women's sizes simply doubles the size and adds the numerical equivalent for the width, making 94 for 43/4 D for example

Concerning hats—if you want to hear some startling theories about hat sizes, ask any group of men what the size numbers mean

As a matter of fact, if you wear a 7 hat, it doesn't mean that your head is either seven mehes long or seven inches

wide. You arrive at the number this way Measure both diameters of your hatband, length wise and breaith wise and the two together; and divide the sum by £. If the length is 8 mehes, the width 6, the sum will be 14. Divide by £, and you have your hat size, 7

As for women, they are only just begunning to discover that they have head sizes. Bobbed hair and the close fitting but are

accompaishing that

Women's hat saxes not rate the exact number of melies around the head. Thus, a woman who wears a 24 hat measures just 24 melies around her head.

Ten years ago, the average American woman were a 24 hat. Today she is wearing a 22. The woman with hair " as the in-Binerical her is being hard put to it to find hair large enough."

AMONG all the clothers at I haberdashers whom I consisted there was unan mety probably on only one point, namely. The average man is actually interested in only one single stem in his cut re wardrobe. That is, his codar

It is the one article, at any rate, which he absolutely refuses to wear if it not the exact size to a quarter of an anch." such one collar manufacturer, "Gloves, above, hats, anything else will 'go' if a little off-one, but not so the collar.

"The average American neck is 13% norbes, but it seems to be the most elastic part of the body, next to the want line. Collars run from eleven to twenty inches.

Funny, too, the way men stock to their own ideas on the fit of their collact. Theoretically, your neck should measure exactly 15 % inches for a 15 % collar. That is, the collar measures 15 % inches from the middle of one front buttonhole to the outer edge of the other. Actually, some men prefer one fourth or one half of an inch analter, and a few even one fourth of an inch analter, and nothing on heaven or earth could change their view!"

Men's shirts are designated by the neck and, too, because that is the pari that must fit exactly. The sleeve length is taken, with the arm crooked, not from the shoulder but from the center back of

the neck to the wrist.

AT LEAST there's nothing mysterious about socks and stockings

"Why, of course, a size 10 stocking means a ten-inch foot length," exclaimed the first howevy nucker I consulted

"It is currous, when you think of it, that men never remember the use of their socks and never forget the size of their shoes. For they certainly buy socks three times as often as they buy shoes. Yet men come in again and again, took blank when the homery clerk asks the size, and finally say, "I wear an 6 shoe—what size stocking goes with that?"

"It should be easy to remember, because the sock size is exactly the length of the foot. My own theory is that men remember their 8 shoes rather than the corresponding 11 socks because subconsciously the larger mander makes them think they have large feet."

L. J. Gement made that in a small New Hampshire town. Butters made \$592. in one month. McPhail \$1,140.10

in four months. Others are making even more.

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# Stop Using a Truss



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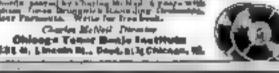
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## What All Industry Owes to Eli Whitney

(Continued from page 54)

Haven, a group of his friends were at the dock to greet him with news of fresh

"Eli," mid one of them, "only yesterday your shop was destroyed by fire, and all your machines with it "

For a moment Whitney accepted the news in silence. Then, with a sudden gesture of disgust, he flung out his arms as if to sweep aside all his misfortunes,

"I have had enough," he said, "I have merifieed everything, and for my pains I have been treated as a swindler and a villam. Today I am bankrupt; there is nothing left to me but debts. I have given the best years of my life to make fortunes for others; now I will make one for myself "

IT CHANCED, at this time, that Whitney heard of a project of the American government to manufacture its own firearms. Heretofore muskets, incported from abroad, had been made one at a time by skilled experts.

"It may require incommon skill to make a complete musket," thought Whitney, "but certainly any mechanic of ordinary ability should be able to turn

out part of a musket."

From that thought Whitney's active brain conceived the idea which not only carried him to financial independence, but which revolutionized manufacturing proccomes throughout the world. Instead of making muskets one by one, he would turn them out in lote of hundreds, and even thousands. He would design each part to a precise standard pattern, Each of the several parts, in the course of manafter ture, would pass through a succession of processes, and at each stage a workman woold perform just one simple mechanical operation. In the final stage the pairts, fitting exactly with one another, would be assembled into the completed musket, a process requiring ordinary skill,

Presenting this plant, with the financial backing of Inends in New Haven, Wintney obtained a contract from the government for 10,000 muskets. Near a waterfall two miles from New Haven, he built his factory, constructed his tools and machines, and trained his workmen.

LITTLE record remains of just what his machines were, or how they worked. But we do know that they turned out superior muskets, and that manufacturers came from far and wide to marvel at Whitney sarmory. We know, too, that the methods he devised were widely copted, and that they became the foundations for our modern industry.

So, because of the genus who went hankrupt making "cotton king," we who are living today can afford the many common necessities and luxuries which are vital to modern life. The automobiles we ride in, our typewriters and desks, our watches, knives, radios, sewing muchines, farming muchines, the shoes we wear-infact, almost every conceivable article produced for our use in large quantities has been brought within our grasp through the struggles of Eli Whitney.

## RNIOF



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# EENE

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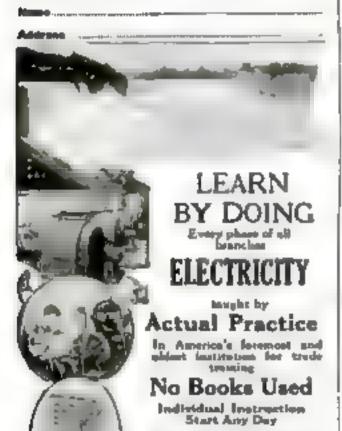
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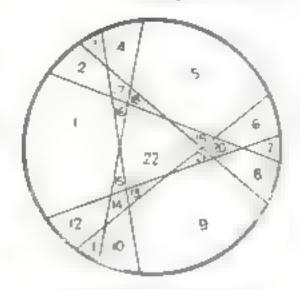


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## Solutions to Last Month's Sam Loyd Puzzles

Check your answers and see how nearly correct you were



#### How Grandma Cut the Pic

With only six straight cuts of the knife, Grandma divided her pie in twenty-two pieces as shown, getting big pieces for the grown folks and small ones for the children.

#### The Florida Land Puzzle

Calling the width of the plot fix feet, and its length 4x, then its diagonal line would be 5z. The dimensions of the large rectangle contained within the diagram would be Hz by Ekc or 1442 against feet. Four complete plots and four balf-plots are located within the large rectangle, and the total area of those six plots in 72x4 square feet. The remainder of the rectangle's great. That against feet, constitutes the starlike park. The area of the eight plots equals 90st agency feet, and cost 40,000 The park's cost, at the more rate a square foot would be "/m of \$0,000, or \$7,100

## Maggio's Age

In this puzzle it may be said that Maggie a present up to 12 to Tommy's 20, for when Tommy was 6 years older than Maggie is now, he was 16 and abe 10, which is half his present age. In 14 years she will be 6 years obler than Tommy's present age, or 20. Then Tummy will be 34 and mother 60.

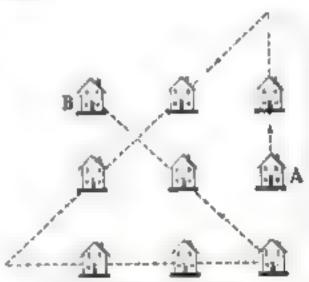
#### The Match Game

Considerable analysis as required to prove that the winning opening play is the removal of one match from the group of 8, leaving the other groups 3, 4 and 7. Other wanning groups to leave for one's opponent are: 8, 4, 5; 1, 4, 5; 2, 3; 1, 1, 1, or reducing the groups to two. 4, 4 3, 3, 2, 2

## The Milkman's Puzzle

Let us call one of the ten-gallon onto A and the other B. Then

tall five-quart paul from can A. Pour fivequart pull into four-quart pail. Empty four-quart pull into can A Pour five-quart pail into four-quart pail. Fill five-quart pail from can A. Fill four-quart pail from five-quart pail. Empty four-quart pail into can A. Fill fourquart pail from can B. Pour four-quart pail into can 4, which fills can 4, leaving two quarts in four-quart pail. Thus the milkman has supplied each of his customers wit. Iwo quarts



The Poultryman's Ropte

This diagram shows how the post, ryman can cover his route in four straight moves. To do no he must go a little out of the bounca of the people or book but the violates no emplition of the problem

## How to Foil the Auto Thief

(Continued from page 6),

and while he was away I discovered that there was a secret shut-off valve in the gas pipe under the most that had jarred closed. It was a second-hand car, and the owner didn't even know that confounded valve was there! I only charged him half price, because it was half my fault '

"By jinks" mel Thatcher enthusustrially. "I am going to put something like that on this bus right away

"Don't do it 'advised Gus. "Even with the gas shut off, your car will run quite a ways on the gasoline in the vacuum tank, and if the crook can get out of sight he can stop and find the trouble easy enough.

YOU go into the office with Joe now while I straighten out a few more title kinks here and pick out the kind of a lock wheel for you. We'll have to order it anyway. I'd suggest that you choose one of the kind that swings up out of the way when you get in and out of the car."

"All right," agreed Thatcher. "And while I am about it, I guess I'll get a good parliock and chain for the spare."

"I can show you something better than that," suggested Joe. "Put one of these locks on in place of the bolt that holds the spare tire on the rack. It's a lot better than the padlock and chain combination, because there's no way of cutlung it with a bolt cutter, and besides that it can't rattle around and chip off uli the paint i

"And how about a padlock for the tool tox, too" Thatcher inquired

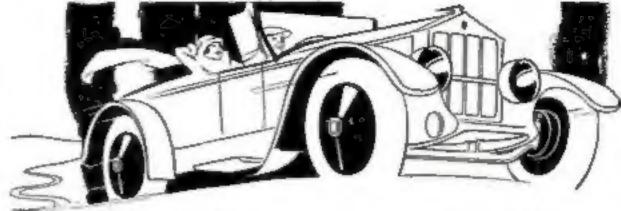
"We have them in all sizes and prices," and Joe as he pulled out a board with a lut of samples fastened to it. "Some of these are low proced, but a high-grade padlock is well worth while. It's stronger, almost impossible to pick, and it wou't rust up and stick so you can't unlock it '

"Sort of like locking up the harn after the horse is stolen," granned Thatcher "Only in this case I've got the 'boxse' back and don't want to lose him again!"

Or the MANY magazines and journals that I take, Popular Science Monthly is the one that I feel that I could not afford to do without.-Mrs. M. A., Seattle, Wash.

## Here Are Correct Answers to Questions on Page 48

- 1. The violinist plays by putting his finger on his strings at different places, and changing the length of the string. Since even a hundredth of an inch difference in length makes the string play a different note, he is able to play very many notes on four strings.
- 2. The pads of cartilage, or gristle. that line the joints, produce a fluid which acts as a lubricant, as oil in an engine.
- 3. The attraction of the moon, with some help from other heavenly bodies. As the earth turns, the moon attracts the water in the ocean and raises a bulge in it. This bulge is the tide.
- 4. To aprout, a seed needs proper temperature, water, and oxygen. During winter the seed soaks up water. In the spring the soil gets warmer and some of this water runs out. Air gets in and the seed obtains oxygen. When this and the temperature are sufficient, the seed begins to sprout.
- 5. Milk which has been heated to 110 or 120 degrees and kept there for about half an hour. This kills most of the bacteria, and the milk keeps better.
- 6. It comes as radiant best, a kind of ether waves; the same as light, except that the waves are longer and invisible.
- 7. We have a tendency to imitate whatever we see other people do. Yawning when other people do so is simply one instance of this tendency. It is common because yawning is an easy thing to do.
- 8. To produce low temperatures, often as low as 200 to 300 degrees below zero Fahrenheit. Such super-freezing temperatures are needed in taking the gas out of vacuum tubes for radio.
- 9. Many microscopie creatures have tiny shells made out of lime. Many bucteria also take lime salts out of water and make little particles of solid lime. This lime accumulates on lake and sea bottoms. Millions of years later, after it has hardened enough, it becomes limestone. Geologists believe that nearly all limestone has been produced thus.
- 10. By measuring the amount of water it "displaces," that is, the volume of the part of the hull that is under the water line. The weight of this water is the weight of the ship. Every floating body sinks until it displaces exactly its own weight of water.
- 11. The sun is shining above the clouds. Part of this light gets through, just as some light will shine through a white cloth.
- 12. In three ways. First, a mirage quivers and changes its shape as you watch it; a real lake seldom does this even from a long distance. Second, there is generally dark-colored vegetation around a real lake. Third, there are usually birds flying near and above a real lake.



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ren make his money just talling your friends shout it. Here's how this wonderful little device works. Every enriquents is adjusted to make starting casp flut once the engine gets heated up the maxture is far too rich. Balf of the gusoline is drawn into the cylin-

ders in a raw state, and, instead of exploding, it burns. This causes a heavy deposit of carbon. But with this startling little de-vice in a cur all this is changed. As soon as the engine warms up, this device automatically begins to admit

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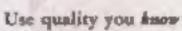


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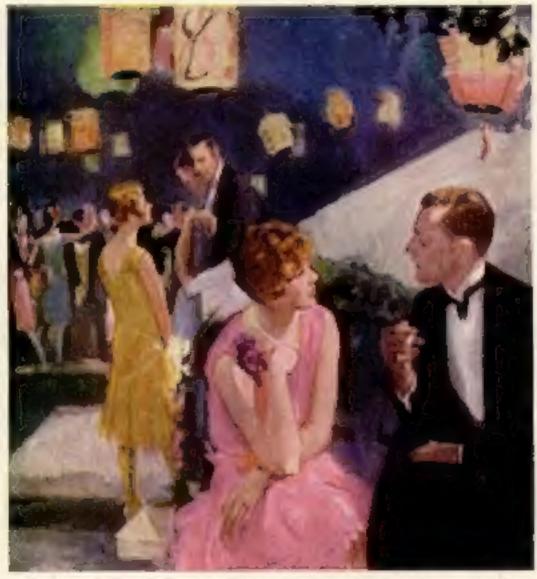
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RADIO CORPORATION OF AMERICA New York Chicago San Francisco

# RCA Radiotron

MADE BY THE MAKERS OF RADIOLAS

# When there's singing and dancing on the lawn-and the gay crowds swing to music under the lanterns and the canopy of trees -have a Camel!



No other eigerette in the world is like Camela. Camels contain the choicest Turkish and Domestic tobaccos. The Camel blend is the triumph of expert blenders. Even the Camel cigarette paper is the finest, made especially in France. Into this one brand of cigarettes go all of the experience, all of the skill of the largest tobacco organization in the world.

WHEN it's evening with mercy dancing on the lawn. When the world is young with youth and gay with age -have a Camel!

For no other cigarette made was ever so joyous on carefree evenings. Camel is fair companion to busy days and glamourous, restful nights. You just can't smoke enough Camels to tire the taste. Camels never leave a cigaretty after-taste. The choicest tobaccos that nature grows, blended to bring you their purest enjoyment, are rolled into Camels. Camels are the found-true friend of millions of experienced smokers.

So as you make merry with friends on this most enjoyable of nights. As you join the gay party when the work is done-taste then the kindliest smoke that ever came from a cigarette.

Have a Camel!





price. R. J. Reynolds Tobacco Co. Winston-Salem, N. C.